DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

METAL FINISHING

AUGUST, 1952 VOLUME 50 • NUMBER 8

CONTENTS

COMING SOON

A cost system for decorative plating, listing all the items that should be included for accurate analysis of production costs.

Production of cast nickel anodes to obtain proper corrosion and minimum sludge.

Short cut in the calculation of nickel sulfate and nickel chloride in the analysis of Watt's type nickel plating solution.

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by Palmer H. Langdon, 1868-1935

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 Re-entered as second class matter June 13, 1940 at the post office at New York, N. Y. under the Act of March 3, 1879.

The WASHINGTON OBSERVER

Charles A. Cerami

News and Views from The Nation's Capitol

• The NPA has promised to allot nickel to the electroplating industry to the amount of 25% of a plater's purchases in a six months consecutive period ending June 30, 1949, or December 31, 1949, or June 30, 1950. It has agreed to allow small platers at least 100 pounds of nickel a month.

• Some members of the Electroplating Industry Advisory Committee told NPA officials that they are opposed to basing nickel allotments on a purchase basis rather than on the consumption basis. The NPA is not prepared to change their basis because they feel that their information of nickel consumption is inadequate to form a fair percentage on that premise. Manufacturers who used nickel inventories rather than purchases during the period January 1, 1949 to June 30, 1950 should apply to NPA for an assigned percentage basis.

• At a recent meeting of the Electroplating Industry Advisory Committee NPA officials asked the Committee's opinion of their proposal to revise order M-80 to permit the use of nickel as a "flash" undercoating of one ten thousandth of an inch prior to chromium plating for items now on the prohibited nickel use list. The Committee as a whole welcomed the proposal, especially for electroplating shops located in non-industrial areas.

• The NPA has removed all inventory controls on zinc by revoking Order M-9. All restrictions on the end-use of zinc and cadmium controls have been removed.

• An inexpensive process of making an aluminum base alloy coating for ferrous metals has been developed by General Motors Research Laboratories in Detroit, Michigan. This coating not only prevents rusting but it also has remarkable heat resisting qualities.

• The NPA removed from its scarce materials list carbon tetrachloride, all forms of antimony, bismuth, cadmium, all forms of lead, zinc-base alloy, zinc dust and oxide, and zinc and zinc base alloy scrap.

• The third quarter allotments of copper are about 10% greater than those in the second quarter.

• The NPA amended CMP Regulation 5 to simplify the rules governing the procurement of maintenance, repair and operating materials.

• The NPA reveals that 3,500 small manufacturers will have open capacity available for defense production during the third quarter of this year. These include manufacturers of toys and games, costume jewelry and novelties, silverware and plated ware.

• The Army's substitution program is expected to save, in the fourth quarter of this year, 1,010,137 pounds of copper, 425,856 pounds of zinc, 145,023 pounds of nickel, and 225,445 pounds of aluminum.

• The Defense Production Administration has approved, as of April 10, 1952, tax amortizations to the amount of $663,000 to seven galvanizing and other hot-dip coating establishments and $851,000 to nine electroplating establishments.

• The supply of tin is not sufficient to modify controls.

• The Office of Price Stabilization has exempted foreign copper from price control. The regulation which set the ceiling price at 27.5 cents has been revoked. American users will now be able to go into world market and buy copper at any price they choose.

ABLISHED 1903

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METAL FINISHING

UME 50 • NUMBER 8 • AUGUST 1952

Why Be Disappointed?

"Blessed are they which expecteth not.
They shall never be disappointed"

For a year and a half now, too many users of nickel as a finish for their products have been living in hope. Instead of directing their efforts towards establishing suitable substitutes in their production cycles, they have been concentrating on stretching their supplies, expecting that each quarter would bring them an increased allotment of nickel. Each quarter, however, has found them getting closer to the bottom of the barrel and the expected allotment has usually turned out to be an unanswered prayer.

Let's face the sad facts. The nickel situation shows no signs of improving in the foreseeable future. It may even get worse, if such a thing could be possible. Defense requirements are claiming not only present nickel production but a good part of the increase expected during the next two years as a result of the expansion of mining and refining facilities. Nickel platers are going to be in for some very hard times unless more of them start putting one foot ahead of the other.

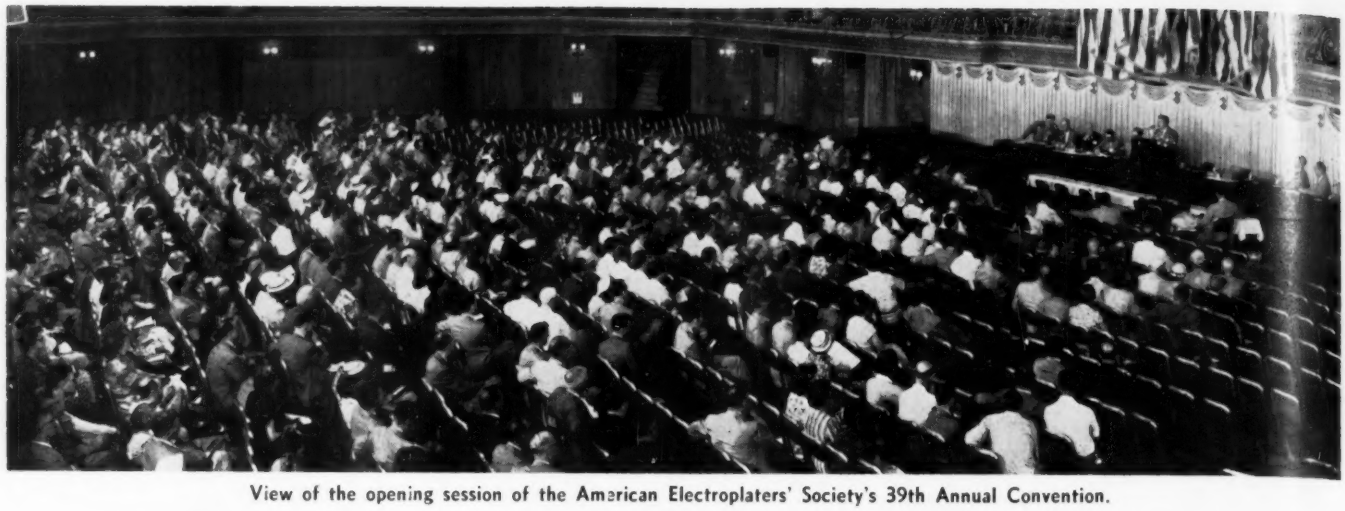
Electroplating as a protective finish received a black eye during the last shortage a few years ago, from which is has only been recovering slowly. The last year has again confronted us at every turn with the consequences of quality deterioration. Haven't we all remarked at one time or another on the poor appearance of bright work on metals exposed to the weather? The pressure for substitution of stainless steel in place of plated finishes becomes stronger at times like these, especially since straight chromium steels, requiring no nickel, are in fairly good supply.

Substitute finishes, such as white brass, copper and bright zinc, followed by chromium direct, have their spheres of applicability. Clear, baked organic coatings are being applied to such chromium finishes to prevent unsightly atmospheric corrosion, where possible. For severe exposure conditions, however, they will not take the place of a heavy nickel deposit.

Now, fortunately, the copper situation has eased considerably and, although numerous exposure tests have proved conclusively that a heavy nickel deposit is better than the same thickness of a composite copper-nickel plate, the composite plate will still be enormously superior to the thin direct nickel on steel employed too extensively at present for the good of the industry.

We must resign ourselves to a continuing nickel shortage but let us not waste the nickel we still have available to us. If we cannot spare enough nickel to do the job right, let us do the next best thing, now that we have copper. A light nickel over a heavy copper deposit will give us a finish of which we need not be ashamed and may tide us over until better times arrive.

NATHANIEL HALL



View of the opening session of the American Electroplaters' Society's 39th Annual Convention.

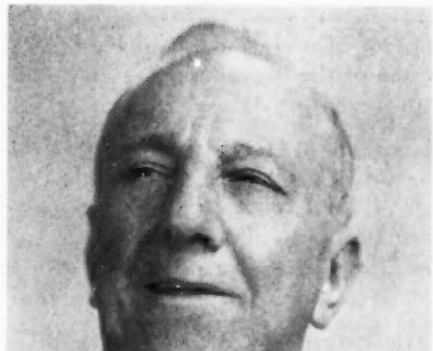
A Report on the Chicago Convention

By Palmer H. Langdon

WHILE the total registration of 1569 did not break the record set by Detroit in 1947, the 1952 Chicago Convention will go down in history along with the best. The Industrial Finishing Exposition held concurrently was most successful. With 129 exhibitors covering all phases of the industry and an attendance of 6,000 this show was a real credit to the finishing industry.

Registration started Sunday afternoon, June 16th, at the Conrad Hilton hotel under the direction of *Harold J. Faint, Industrial Filter and Pump Co. Mrs. Marion Longfield* headed up the Ladies Hospitality Committee.

The opening business session on Monday morning was presided over by *Clyde Kelly*, general chairman, and now new AES third vice-president. *Herberth Head* spoke on the Industrial Finishing Exposition and *Michael Di Salle*, former Director of the *Office of Price Stabilization*, was the keynote speaker. A unique feature was the selection of a "Convention Queen." *Mrs. George B. Hogaboom* drew the three winning tickets and Supreme President *Cleve Nixon* announced the winners to be: Queen, *Mrs. S. Zietman*, of Pittsburgh, and the attendants were *Mrs. Lawrence Davis*, of Jamestown, N. Y., and *Mrs. S. J. Beyer*, Louisville.



Franklyn J. MacStoker
Supreme President

On Monday noon, the *Metal Finishing Suppliers Association* held its annual luncheon in the Boulevard Room of the Conrad Hilton. Progress made since the reorganization was reported on by the President, *A. P. Munning*, of *Munning and Munning*, Newark, N. J. All the officers were reelected unani-

Dr. George P. Swift
1st Vice-Pres.

Dr. Ralph Schaeffer
2nd Vice-Pres.

Clyde Kelly
3rd Vice-Pres.

Michael Di Salle, former director of the OPS, cuts a metal plated ribbon opening the Industrial Finishing Exposition at Chicago's International Amphitheatre. Herb Head of Briggs Mfg. Co. (left) and Clyde Kelly, Exposition and Convention chairman (right), watch the ceremony as the crowd waits to attend the Show.

AFTER THE CROWNING AT FELLOWSHIP OPEN HOUSE

Mrs. Lawrence Davis, Mrs. S. Zietman, Mrs. S. J. Beyers.

mously to serve another year. They include, in addition to Mr. Munning; *A. N. Braun, Agate Lacquer Co.*, Long Island City, N. Y., first vice-president; *Charles E. Berry, Maas and Waldstein Co.*, Chicago, Ill., second vice-president; *Manson Glover, Glover Coatings Co.*, Malden, Mass., third vice-president; and *Thomas A. Trumbour, Finishing Publications*, Westwood, N. J., secretary-treasurer.

Fellowship Open House, sponsored by the Metal Finishing Suppliers Association, on Monday evening was attended by over eleven hundred persons. During the evening, Mrs. Zietman, the Convention Queen was crowned by President A. P. Munning, and door prizes, Government bonds, were awarded to the lucky ticket holders.

The technical sessions, held at the Stock Yard Inn, were well attended and have been abstracted in our June issue, pages 91, 92 and 102.

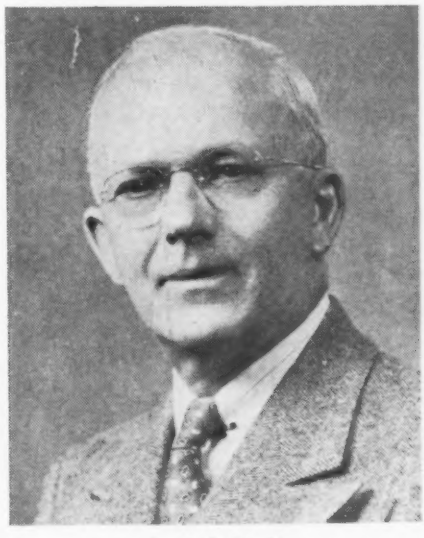
The golf tournament played at the Nordic Hills Country Club and sponsored by the MFSA. Low Gross—79 was won by *Jim Baduluco*, of the *J. C. Miller Co.*, Low Net—70 by *Fred Edwards, United Chromium*. 2nd Low Net—71, *Oscar Kuntz, Kuntz Electroplating Co., Ltd.*, 3rd Low Net—72, *Mike Borushko, Harding Mfg. Co.*

In the annual ball game, played in Grant Park, *Larry George's* West team won 8 to 7 over *Art Logozzo's* Easterners. Art accused the West of hiding the diamond, playing with a basketball and having a ring of *Udylite* salesmen in the outfield, but everyone had fun.

The ladies program was especially successful at this convention under the

Cleveland F. Nixon
Past President

Dr. Donald G. Foulke
Exec. Sec'y.



Frank C. Mesle
Honorary Member

William M. Phillips
Honorary Member

Officers of the Metal Finishing Suppliers' Association. Seated: Manson Glover, 3rd Vice Pres., A. P. Munning, Pres., Tom Trumbour, Permanent Sec'y, Al Braun, 1st Vice Pres. Standing: Rudy Hazucka, a Past Pres., Chas. Berry, 2nd Vice Pres.

chairmanship of Mrs. Marion Longfield and able assistance of Irene Donnelly, Chemist, *Scientific Control Laboratories*. It included the *Aunt Ella Party*, under the sponsorship of *David X. Clarin*, of *Oakite Products, Inc.*, and the *Plato Party*, directed by *Mrs. John T. Wiarda*, sales manager of *Metal Finishing*. *Danny Gray of Oneida Ltd.* made it possible for the ladies to receive some very beautiful pieces of silver. *Gerry A. Lux, Oakite Products, Inc.*, gave a very interesting informal talk to the ladies. "How Detergents take The Rubbing Out of Scrubbing." Four hundred and eight ladies participated in the activities.

At the closing business session, presided over by President Cleve Nixon, it was announced that temporary charters have been granted to groups at Kansas City and Wichita. The Society now totals 5,648 members and is growing. Twenty-seven of the forty-six branches reported increased membership since the last convention. Branches among the larger groups showing the greatest increases were Melbourne (Australia), Chicago and Toronto, among the medium sized groups Buffalo, Indianapolis and Syracuse, and among the small group Dallas-Fort Worth, with an increase of 123%, Houston and Saginaw Valley.

The branch exhibits which were housed at the Industrial Finishing Exposition received awards as follows: First place went to the *Waterbury Branch* and second place to the *Hartford Branch*. The latter exhibit contained, among other items, a cut-a-way jet aircraft engine built by *Pratt and Whitney*. A special award was presented to the girls of the *Immaculata High School* for their exhibit of anodized aluminum objects.

A resolution to provide for interim meetings of the society was adopted because of the increasing amount of business developing between annual meetings. The by-laws were changed to provide a member from the host convention city on the editorial board. The budget submitted by *Franklyn J. MacStoker* was approved. A motion to establish the dates of the annual convention during either the last two weeks of June or the first two weeks of July excluding the July 4th holiday, proposed by the executive board, was defeated A motion to select convention locations four years in advance was adopted. The locations selected for future conventions are as follows:

1953 — Philadelphia
1954 — New York
1955 — Cleveland
1956 — Washington

Honorary members were elected as follows:

Frank C. Mesle, former president of the AES (1927), organized several upstate New York branches and is the author of several medal winning papers on silver plating. At present associated with *Oneida Ltd.*

William M. Phillips, former president of the AES (1939). Head of Electrochemistry department of *General Motors Research*, first to publish an article on low pH nickel baths, former chairman of the public relations committee.

Joe Duffy
Golf Chairman

James Zeder, vice-president and director of Chrysler Corp. (right), presents the first Carl E. Heussner Award in honor of the late Chrysler electroplating executive, to Edward Parker of Technic, Inc. of Providence, R. I.

Gerry Lux
Gave talk on detergents.

Mr. George B. Hogaboom and *Mr. Walter Pinner* spoke on the possibilities of organizing an International group in this field to work with the national groups established in England, India and Japan and to set dates for possible future international conferences. *Dr. Walter R. Meyer*, former editor of *Metal Finishing* and now president of *Enthone, Inc.*, is also a member of this committee.

Dr. Samuel Heiman, of the Philadelphia branch, briefly outlined his plans for next year's convention. He is associated with the *Philadelphia Rustproof Corporation* as chief chemist.

Mr. Manson Glover was given an award of merit for his activities in connection with the chairmanship of the law committee. Mr. Glover is president of the *Glover Coating Corporation*, of Malden, Massachusetts, and second vice president of the Metal Finishing Suppliers Association.

Officers elected for the coming year were as follows:

President, *Franklyn J. MacStoker*, a member of thirty years standing. His name was placed in nomination by *Mr. Ellsworth Candee*, of the Waterbury branch and seconded by *Mr. George Schore*, of the New York branch.

First Vice-President: *Dr. George Swift.*

Second Vice-President: *Dr. Ralph Shaeffer.*

Third Vice-President: *Mr. Clyde Kelly.*

The new officers were installed by the newly elected honorary member, Mr. Frank C. Mesle.

The subject of future expositions was left up to the decision of the executive board.

Right to left: F. P. MacStoker was elected president of the American Electroplaters' Society; Dr. G. P. Swift, elected 1st vice-president; Dr. R. A. Schaefer, elected 2nd vice-president; Clyde Kelly, elected 3rd vice-president and Cleve F. Nixon is the retiring president.

The *Hanson Van Winkle Munning Company* was given a vote of thanks for publishing the official *Convention News*. Its staff consisted of *Richard Morrison, Gilbert Norton* and *Mildred Gleason.*

We Are Sorry to Report

An old friend of the American Electroplaters' Society was unable to attend the 39th Convention. Jacob Hay, President of the Jacob Hay Company and an energetic sponsor of our Society since the early days, was taken ill a short time before the opening of the Convention.

Jake was missed by many of us and we are sure he would appreciate hearing from his old friends. His address is 4014 West Parker Ave., Chicago 39, Ill.

Thieves Busy at Close of Show

It has just been brought to our attention from a letter being issued by A. P. Munning, President, Metal Finishing Suppliers' Association, that many of the exhibitors were robbed of many articles in their displays while attending the annual banquet and entertainment at the Conrad Hilton. It was virtually impossible to estimate the extent of the banditry, but from statements obtained from a small cross-section of exhibitors interviewed, the pilferage was thought to be general and substantial. The thieves looted not only those booths displaying silverware and domestic electrical appliances, but also tools, small air compressors and similar items. This unhappy experience should be a warning in connection with future expositions.

Mrs. Marion Longfield
(Ladies Chairman)

Joan T. Wiarda
(Plato Party Hostess)

Dave X. Clarin
(Alias Aunt Ella)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THERMIT
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HEAT BATH
CONFUSING AINT IT ?
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Presto Black
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Blossom Black
Cozy Black
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EXHIBITORS OF EQUIPMENT AND SUPPLIES

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Almco Division, Queen Stove Works, Inc.
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American Rack Co.
Americana Corporation
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Distillation Products Industries
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General Chemical Division
Allied Chemical & Dye Corp.
The Globe Chemical Co., Inc.
The Grav-i-Flo Corp.
W. Green Electric Co., Inc.
Hammond Machinery Builders, Inc.
Hanson-Van Winkle-Munning Co.
The Harshaw Chemical Co.
H. N. Hartwell & Son, Inc.
Haveg Corp.
Jacob Hay Co.
Heatbath Corp.
Heil Process Equipment Corp.
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Nelson Chemical Co.
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Promat Division, Poor & Co.
Rampe Manufacturing Co.
Ransburg Electro-coating Corp.
Rapid Electric Co.
Rinshed-Mason Co.
Roto-Finish Co.
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South Florida Test Service
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United Chromium, Inc.
The Van Dorn Iron Wks. Co.
Wagner Brothers
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Edwin L. Wiegand Co.
Wyandotte Chemical Corp.

Figure 1. First unit of Spar-Tan Engineering Co., plant for Porus-Krome Process.

Rebuilding Engine Cylinders and Liners

Worn Machine Surfaces Built Up With Iron and Porous Chromium

By Fred M. Burt, *Los Angeles, California*

Spar-Tan Engineering Company, incorporated in 1945, was conceived to specialize in prolonging the life of the working parts of internal combustion engines through hard-chrome plating (Figure 1).

A major forward step, following four years of steady growth, was taken in the fall of 1949, when Spar-Tan Engineering Company became the West Coast licensee (11 states) of the Van der Horst Corporation of America. With Van der Horst "Porus-Krome" process available in Los Angeles to western industry, Spar-Tan Engineering soon found its plant far too small for service to its rapidly growing list of users and, in January 1951, the company moved to a larger plant at its present location three miles from the center of downtown Los Angeles. Constant expansion has been necessary during the past year to keep pace with the growing demand for Porus-Krome reclaiming by western railroads, aircraft companies, marine operators, oil companies and many other branches of industry.

With the introduction of Vanderloy M Iron Plating Process, Spar-Tan Engineering Company enters a new era of expansion. Plans are underway to double present plant capacity and bring the process to western industry as rapidly as possible. Many new fields will be developed by Spar-Tan and Van der Horst engineers working together on new applications. The future for these processes, plus the ever increasing industrial growth of the West, points to ever increasing growth for this Los Angeles plant. Following is descriptive information covering the Van der Horst processes and their applications at the Spar-Tan Engineering Company plant.

The "Porus-Krome" Process

"Porus-Krome" is a dense, hard, wear- and corrosion-resistant chromium deposit, produced under the Van der Horst Corporation of America's patents, which gives working surfaces an infinite number of tiny oil-retaining reservoirs for perfected lubrication. The process of applying the deposit is basically that of electrolytic deposition of pure chromium on the base metal or part being reclaimed. Extremely close controls of electrolytic solutions, temperatures, electrical currents and timing is necessary, together with carefully controlled reversal of current, to secure the proper high quality of deposited hard chromium and the pores or channels therein, which distinguish Porus-Krome from all other chromium plating processes.

The deposit is harder and has a lower coefficient of friction than any other metal in general use for cylinder surfaces. High heat conductivity reduces oil film breakdown. Hardness resists wear and abrasion. It is interesting to note that the C.A.A. has granted unconditional approval of the Porus-Krome Process for rebuilding aircraft engine cylinders. Air Force and Navy specifications are based on this process. Thousands of aircraft cylinders have been rebuilt for military branches and for commercial aircraft operators.

Plating of Porus-Krome in a cylinder is limited to 0.030″ on the cylinder I.D. This limit is due to the nature of deposited chromium, which roughens as deposit thickness increases. Maintaining dimensional accuracy and smoothness together with proper porosity development becomes a serious problem when plating heavier than 0.030″ on the I.D. Longer plating time and additional grinding steps required, bring in cost factors which establish 0.030″ as the economical I.D. plating limit. Hundreds of railroad diesel, aircraft, marine, and other types of cylinders and liners which are under the 0.030″ oversize limit are, however, being economically reclaimed to standard size each month in the Spar-Tan Engineering Company plant. Vanderloy M will now make it possible to reclaim cylinders not previously suitable for reclaiming with Porus-Krome alone. Any oversize can now be built back to standard by first plating with Vanderloy M as an underlay for a finish plate of Porus-Krome. The physical properties of the chromium deposit are as follows:

Brinell Hardness	600-1100
Linear Thermal Expansion	4.5×10^{-6}/°F. at 68°F.
Thermal Conductivity	0.165 (cal./cm.^{2}/cm./deg. C./ sec. at 20°C.)
Coefficient of Friction Steel on Chromium	0.16 (20% lower than steel on steel)

Processing Parts

The largest current production at the Spar-Tan plant is on diesel locomotive engine cylinder liners, both those which have been Porus-Kromed at the Van der Horst Corporation of America plant in Olean, New York, before being put into service (including Alcoa and GM Cleveland diesels) and those that have not been chromed (Figure 2). Liners are trucked in from the diesel shops of different western railroads and, in general, go through the following operations:

1. The first unit in the tank line is the stripping tank with lead cathodes, (Figure 3) into which the liners which have been previously chromium plated are placed, to strip the deposit without affecting the basis metal. The tank contains a caustic solution and uses reverse current.

2. The stripped and unplated liners are next honed in the No. 249 Barnesdril hone (Figure 4) to remove all dimensional discrepancies and to provide a perfect cylinder bore not more than 0.030″ oversize. The honing machine is equipped with a special pneumatic holding fixture which permits rapid placement of the liners. The liner is held in place, in vertical position, by pressure against its ends; it rests on a bottom plate which has upwards pneumatic pressure. To remove the liner this pressure is released, after which the bottom platform, running on parallel rails, will carry the liner outward by hydraulic actuation. The honed dimensions are checked with a dial bore-gauge, with readings to 0.0005″. The honing stones used on each job are those selected to suit the particular liner. In general, it takes from 15 to 45 minutes to hone a liner, with an average of about 30 minutes.

3. At this point in the process, the 2-cycle engine liners, with ports, receive extra treatment as they require relief over the circle-of-ports area. This is done on a Heald grinder, which not only puts in the relief but also adds slight top and bottom tapers (Figure 5).

4. Next, the 2-cycle units are placed in a special potrable fixture, riding on four wheels, where they are slowly revolved on rollers while the sharp port edges are manually ground slightly, with a small air grinder, to break the edge sharpness.

5. The passageways through the ports are stopped off to insulate them against the subsequent chromium deposits. From here on the 2-cycle and 4-cycle liners progress in like manner.

Figure 2. Railroad diesel engine liners in "as received" condition.

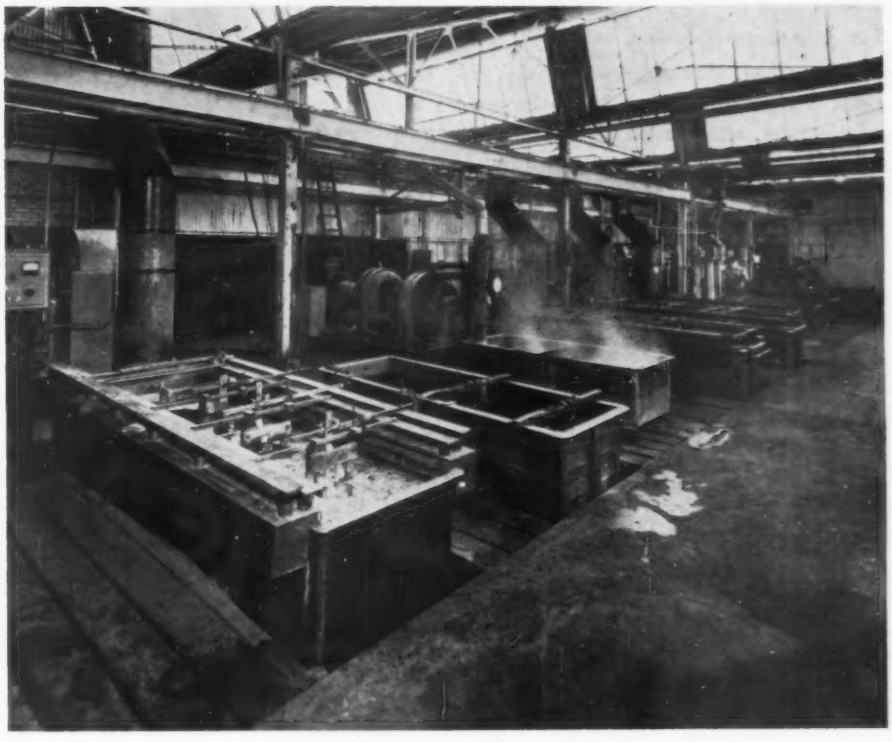


Figure 3. Stripping, cleaning, and plating tank line with motor-generator and rectifier units in background; note, in right background, liner in heavy plating fixture suspended from hoist.

6. The tops and bottoms of the liners are burnished to provide perfect surfaces for over-all contacts with sealing gaskets, in assembly.

7. The inner liner surfaces are burnished and then accurately gaged to determine exactly how much Porus-Krome plating must be applied to obtain the proper I.D.

8. Each liner is now placed in steel plating fixtures (averaging about 600 pounds in weight) for placement in the plating tank. The welded fixture is constructed of heavy steel end plates and joining corners of thick angles. There are five of these big plating tanks currently in the line, with room for more soon to be added. Only one of the very large liners can be accommodated in a tank at one time, with larger numbers of the smaller liners, depending entirely upon their size (the largest liner in the plant at the time of this survey was a 19" by 49" unit from a Clark natural gas engine compressor). The tank line is served from overhead with bridge cranes carrying 1½ and 2 ton hoists.

The plating tank controls as to voltage, amperage, temperature, and time, must be carefully set and checked so that the exact amount and type of Porus-Krome shall be deposited. Also, the electrolyte, or chromium solution, must be kept at proper strength. In this solution chromic acid, in flake form, is the major element. Spar-Tan Engineering Company has grown to be the largest user of chromic acid in the West.

The present production of "Porus-Krome" by Spar-Tan Engineering Company requires a sizable amount of low voltage direct current. This is obtained from a variety of motor-generator and rectifier units. Each unit is selected to give best capacity variations and to fit particular tank installations and work requirements. The present electrical power installations consist of:

1—7,500 Amp. Motor Generator Set
1—5,000 Amp. Motor Generator Set
3—2,500 Amp. Rectifiers
4—1,500 Amp. Rectifiers
4—1,000 Amp. Rectifiers

Conservative estimate of current used for the present plant production volume runs 10,000,000-10,500,000 ampere hours monthly. Early planned production expansion will soon raise this another million ampere hours.

Continuing locomotive diesel liner operation:

9. After the several hours required in the plating tanks, the liners go through an intermediate rinse and then to the reversing tank to complete the plating and de-plating combination operation, that provides the necessary pores in the plated surfaces. Both operations have to follow specific procedures as the reverse current won't produce the desired pores if the plating isn't done to exact specifications.

A bit of historical background would be pertinent at this point. Dr. Hendrik Van der Horst, president of the Van der Horst Corporation of America, Olean, New York, before World War I had come to be known as the leading chrome-plating authority in Holland, (and possibly in all of Europe). Experimenting in plating cylinders to combat the severe corrosive action of sea-air in fishing boat engines, he found that a smooth, plated finish did not provide proper lubrication between pistons and cylinder walls. Through a certain inadvertence that occurred in one of these experiments, a plated cylinder wall was subjected to some reverse current de-plating. Examining this surface, Mr. Van der Horst noted a duller finish with an infinite number of microscopic pores in the plated surface, but with enough chromium deposit remaining on the iron to protect it against corrosive action. Further careful experimentation enabled him to reproduce this characteristic at will.

Subsequently coming to the United States on a special mission just before our entry into World War II, he remained here to give the benefit of Porus-Krome process to our government to step up the combat efficiency of military engines. From this start, and through various further developments, the present company has evolved, providing the benefits of Porus-

Krome and the new Vanderloy M iron plating process for American industry.

10. After leaving the plating line, the liners go back to the honing machine for a special smoothing-up of plateaus between the pores, but with no perceptible removal of chrome plating, using special stones for this operation.

11. After this honing, the 2-cycle diesel engine liner goes through a Heald grinder for a honing grind along the ports (the "Mae West" area) and on the end tapers.

12. Next, the liners are given a hot alkaline cleaning bath and rinse, and then on to

13. Vapor-Blasting, using a Pangborn Hydro-Finish blast converted to full automatic operation. The liner is placed on a steel turntable carried on a steel platform on wheels, which runs out of the booth on a track at convenient working height. As soon as the handling unit moves back into the booth, the door closes automatically and the turntable starts revolving while the blast head comes down inside the liner. As the blast head moves up-and-down inside the liner in oscillating movement, it throws an aqueous solution containing a very fine abrasive and certain chemicals, under high pressure.

14. In a nearby tank a thorough hosing follows with a cleaning solution ejected by air pressure through a hose nozzle; then a hot water immersion tank rinse and, while the rinsed liner is suspended above the tank on the hoist, heat imparted by the hot water results in quick drying. Dried, the liner is next dipped into an oil solution for rust prevention, and is ready for the customer.

Among the great varieties of parts constantly being given this treatment are aircraft engine cylinders, crankshafts, propeller shafts, landing gear, piston cylinders; also compressor cylinders, oil well flow meters, truck, marine and industrial diesel engine sleeves, etc.

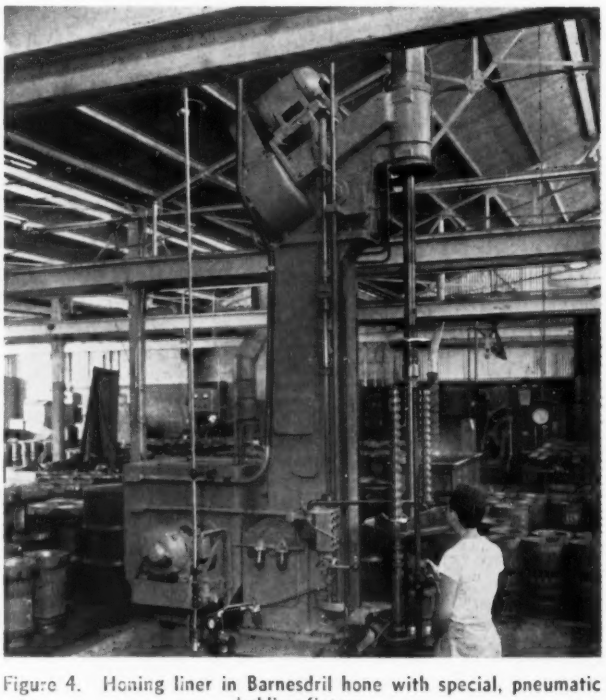


Figure 4. Honing liner in Barnesdril hone with special, pneumatic holding fixture.

Figure 5. Left to right—aircraft cylinders being pre-ground to accurate choke bore dimensions on Bryant Grinder; on Heald grinders, 2-cycle engine liners given 1) grind on end taper, 2) relief grind on port area.

The Vanderloy M Process

The following cost and parts savings advantages of the Vanderloy M Process and description of the technique, with the methods of processing, will be fully applicable to the Spar-Tan operations, as planned for starting up before the Fall of 1952.

As the critical parts of industrial equipment wear out in use, they are being restored by Vanderloy M. With it, the rolling and sliding bearing surfaces, that enable equipment to function, are rebuilt to original dimensions. For about a third less than the price of new replacements, such items as power and compressor cylinders, crankshafts, and the like, are being brought back — literally — from scrap. In carload lots, they are being renewed and sent into regular service. Such results are being accomplished for the first time in history. They amount to a reversal of former practices and requirements.

When less than a thousandth of the weight of expensive bearing parts wear away, the function of mechanical assemblies in which they are used is disrupted. Since bearing surfaces wear unevenly, the usual expedient has been to machine away more of the surface in order to restore smoothness and provide new dimensions that can be used with odd-sized mating parts.

The potential saving of skill, man-hours, production capacity and critical materials is represented by the fact that each pound of Vanderloy M saves replacement of a minimum of 40 pounds (to a maximum of 400 pounds) of difficult-to-make and precision-machined parts. As a typical example, renewal of a 20-inch diesel cylinder liner is accomplished with 12.3 pounds of Vanderloy M. This saves 1,720 pounds of high-quality casting and extensive machining, for which the price of replacement is approximately $1,550.00.

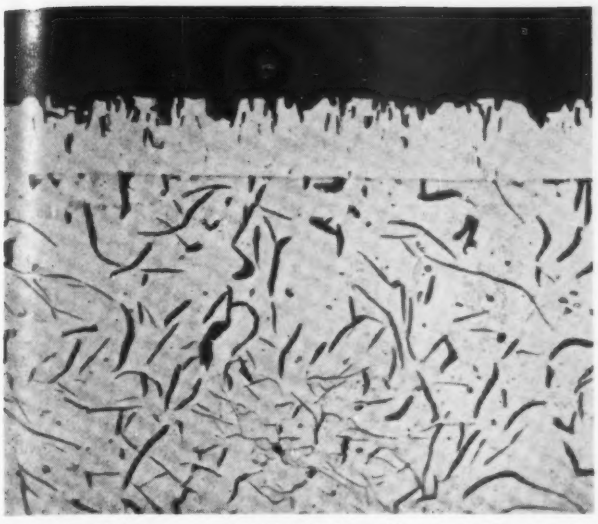


Figure 6. Photomicrograph (X 50) Porus-Krome on base metal, showing pores that continuously feed oil back to surface for adequate lubrication. Dense chromium beneath deepest pores protects cylinder wall from corrosive action of products of combustion.

Much of the business immediately developed by this new iron plating process derives from users of the original Porus-Krome process. Cost factors limited chrome alone to comparatively thin application. Until Vanderloy M was developed, industrial equipment that had suffered heavy wear could not be renewed. Now Vanderloy M is overlayed with Porus-Krome whenever that method is advantageous.

A few years ago the Van der Horst laboratories made a thorough study of all known methods of electrodepositing iron. In fact, they had experimental licenses for several methods, which were actually set up and tried out in their laboratory. None of these produced surfaces having the required physical characteristics, nor the stability of bath control which could work satisfactory in every-day production. As a result, the staff continued research and development to produce an electrolyte which would meet all the requirements. After three years of intensive work, they came up with a distinctly new plating bath (for which patent applications are in process) and a resulting iron deposit, which has very satisfactory physical properties.

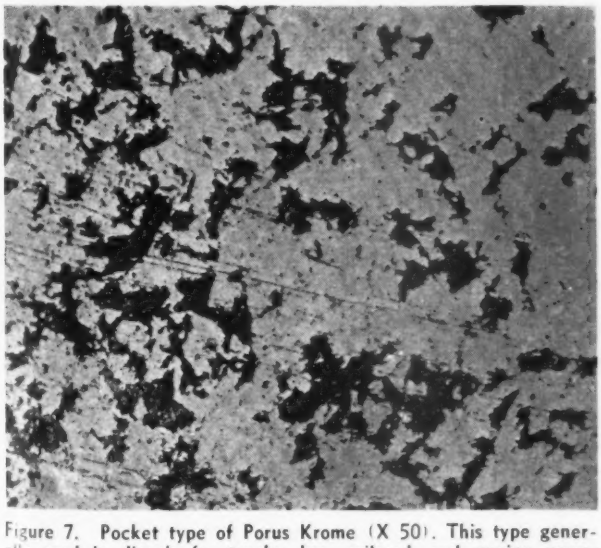


Figure 7. Pocket type of Porus Krome (X 50). This type generally used in diesels for trucks, bus, railroad, and marine power plants; variations used in industrial gas and gasoline engines, pumps and compressors.

Microscopically, this new electrolytic iron develops a fine, columnar structure, with the close packed crystals perpendicular to the surface with which it is bonded. Thus, it offers much the same grain-on-end resistance to the forces of wear as the grain-on-end wood block of heavy-duty factory floors.

The bond, established atomically between the iron deposit and the basis metal, is indestructible. The application of enough force to tear one of the metals apart fails to disrupt its atomic adhesion to the other. While the process now in production produces practically pure electrolytic iron, laboratory indications are that the bath can be adapted to alloy plating. The alloy program, however, is a long-term development project.

Processing Parts

The new type of bath is especially well suited to the production of heavy deposits. As these deposits build up to substantial thickness, there is neither excessive grain growth nor roughness. The latter difficulties often are encountered in the plating baths heretofore known.

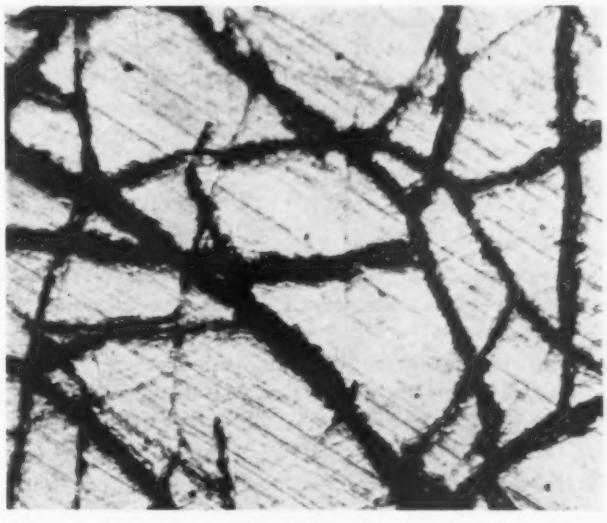


Figure 8. Channel type Porus-Krome (X 50). Military specifications are based on this process, with unlimited approval for its use given by C.A.A.

Vanderloy M deposits can be made of ¼ inch thickness, or more. The limit of thickness, therefore, may be considered as determined by economics and design, rather than by the plating bath.

Distinguishing features of the bath itself are that it remains stable and produces the above results within practical limits of current density and working temperature. This moderately acidic bath is operated at a moderate temperature as compared with such baths as the hot ferrous chloride solution. The advantage of low temperature permits "masking," or "stopping off" with easily applied and low-cost wax. The important problem of bagging likewise has been solved. Bags made either of Vinyon or Orlon contains the low-carbon steel scrap used as anodes.

Preparation is essentially that required in general plating, consisting of the usual degreasing, anodic alkaline cleaning, necessary stopping-off of areas not to be plated, and, just prior to plating, anodic etching in a sulphuric acid bath. This etch not only cleans the surface but is adjusted to remove a superficial amount of metal which generally exists as a "cold smear," or a fragmented, crystal-distorted surface, resulting from

previous machining. Thereby, the iron is deposited upon and bonds atomically with a virgin metal surface, which is free from fragmentation and residual stress.

In both the alkaline and sulphuric baths, the piece to be plated is made anode and not cathode, thus minimizing the absorption of hydrogen. This is especially important on parts which are subjected to stress in operation. While pre-cleaning methods eliminate occlusion of hydrogen in the part to be plated, some hydrogen is occluded during the plating operation because the part must necessarily be made cathode. No effort is made to remove this hydrogen when iron is deposited in engine cylinders, as tensiles and elongation of the thin layer in the cylinder are relatively unimportant. Furthermore, in operation, the cylinder is subjected to a long-term, low-temperature heat treatment which drives off the hydrogen. However, on parts subjected to stress, such as crankshafts, a heat treatment of several hours at 600°F. effectively drives off hydrogen.

Variations in bath composition and plating conditions can produce deposits with a tensile strength as high as 100,000 psi or as low as 50,000 psi. For the present, they have established the conditions for production which approxomate physical averaging as follows:

Tensile Strength	75,000 psi
Yield Point	60,000 psi
Brinell Hardness	200-210

Vanderloy M as now plated on outside diameters and surfaces, machines about the same as alloy steels, having a tendency to be tough. Machining can be accomplished, however, with high-speed steel cutters. Machining of inside bores is more difficult but honing and grinding, of course, are readily done. Fatigue tests are now in progress to determine the endurance limit of the deposit and its effect on the endurance limit of the base metal. Normal expectation would be that it would behave as all ferrous metals, and have a limit for complete reversal of approximately 40-50% of its ultimate strength.

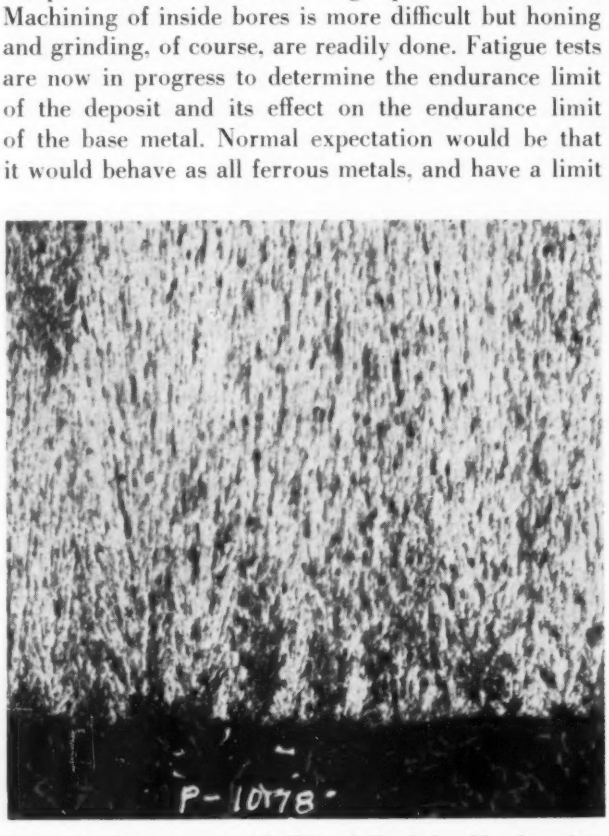


Figure 9. Cross section (X 100) of Vanderloy M, electrolytic pure iron plated on base metal; practically any thickness can be plated without developing grain growth of roughness.

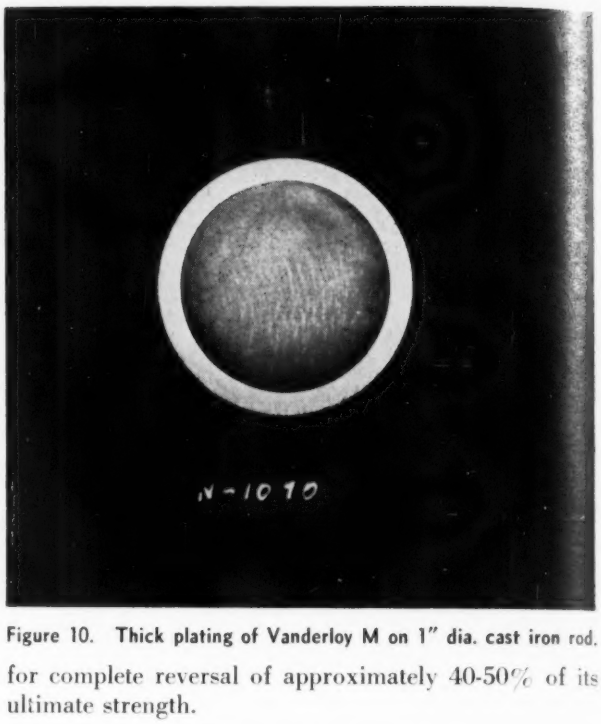


Figure 10. Thick plating of Vanderloy M on 1" dia. cast iron rod.

Processing Parts

From receiving inspection, the parts are first dipped in an alkaline solution to clean them and then rinsed. The cleaning and reconditioning of badly worn or scrapped parts may occasionally entail welding shut of small breaks, cracks, or chipped holes in the surface to be plated. After being cleaned and rinsed, the worn bearing surfaces of each part are machined. To illustrate, cylinders are rebored to eliminate ring steps, tapered wear and scoring, and to reestablish concentricity of the bore. Thereafter, the oil, with which the cylinder wall has become impregnated during use, is baked out. This prevents a seepage that might upset later plating steps.

On ported cylinders it is necessary to radius the port edges with an abrasive wheel, and to protect such areas with paint. Port radiusing prevents excessive "treeing," or piling up of the actual deposit on sharp edges during plating. Painting of the ports prevents the deposit from becoming distributed beyond the cylinder wall proper. The protection of all other areas on which plating is not desired is accomplished by dipping the parts in molten wax. Thereafter, they are assembled in plating fixtures and are ready for renewal with the iron deposit.

The parts are submitted to a brief electro-etch in a tank of sulphuric acid to prepare the plating surface for atomic bonding with the deposit. After rinsing, the multiple fixtures and parts are hoisted into a tank containing the plating solution. When iron plate of desired thickness has been built up on the bearing surface, the parts load is disconnected from the plating current and transferred to the rinse tank. Thereafter, the wax masking is removed by hot water treatment, followed by immersion in a tank of protective oil. Then the parts are disassembled from the fixtures. Grinding of the edges of the plated areas, to re-establish clearance and necessary radii (as in cylinder liners at their ports and both ends), completes the operation.

A Course in the Principles and Practices of Electroplating

By Louis Serota, *Brooklyn Evening Technical High School, Brooklyn, N. Y.*

THE course in the "*Principles and Practices of Electroplating*" conducted at the Brooklyn Evening Technical School was introduced at the suggestion of *Mr. Walter A. Raymond*, who was then Editor of *Metal Finishing*. The heavy concentration of the plating industry in the metropolitan area, and the need for the development and improvement of technical skills for many of the men employed, seemed to provide a fertile field for such a project.

Objectively, a course was planned to include the following elements: a study of the fundamentals of chemistry and electricity; the promotion of a better understanding and appreciation of the practices of the plating industry; an appraisal of related literature for reference and as a course of information for new developments; contact with men prominent in the various branches of electroplating through the medium of guest lecturers for the class meetings and association with the *American Electroplaters' Society*. A course so integrated could, it was believed, provide a sufficiently wide scope for the benefit of the many who would avail themselves of the opportunity for free education by the *Evening School Div.* of the *Board of Education of the City of New York*.

First announcement of the availability of the course was made in the July and August 1950 issues of Metal Finishing, and the response was quite favorable. Applicants represented all levels of the plating field ranging from tank operator to foreman, supervisor, manager, small shop owner, and salesman. To some, the course would serve as a refresher; to others it would be an introduction to the technical basis of plating. Because of the varied background of those registered, the course was planned so that it would meet the requirements of the greatest number. The group seemingly responded favorably to the program, for the course continued with the initial arrangement and one class of the first group is now completing the second year of study. Other groups have started and are continuing.

The presentation of the subject matter in the course was, to a great extent, functional. The organization of the time devoted to each topic depended upon the application of the subject to daily practices and the ability of the class to interpret the essential phase of a topic. The outline can therefore be presented in the manner of a general plan. Modifications that will be made due to additional equipment ordered and the class experiences gained each term must, of necessity, vary the time. Classes meet an average of 42 nights for a five month term, each session taking one and one-half hours. Five guest lecturers appeared each year.

General Outline of Course

First year:	
Atomic structure	3*
Calculations for tank capacities—metric system	1
Specific gravity	2
Conversion factors	2
Acids; bases; salts	2
Standard solutions	3
Standardization of solutions	3
Analysis of acid copper bath	5
Oxidation; reduction	2
Analysis of chromium bath	10
Hydrolysis; pH; buffers	4
Electromotive series; galvanic cell	2
Analysis of nickel bath	10
Complex compounds	1
Analysis of silver cyanide bath	7
Electrical circuits; parallel; series; Ohm's law	5
Electrochemical equivalents; current density; current efficiency	3
Testing of electrodeposits	12
Second year:	
Gravimetric analysis	
Analytical balance and method for its use	6
Sulfate determination for sulfuric acid in chromium bath	15
Cathode efficiency determinations with copper coulometer	20
Plating tests with Hull cell	12
Buffer action in nickel solutions	4
Deposition and corrosion if metals	20

Details of Course Content

The general outline begins with the study of the elements, the structure of the atom, the arrangement of the elements in the periodic chart, formula weights, isotopes, radioactivity, electrovalent and co-valent linkage. This order provided an early opportunity to discuss a recent development relating to the use of isotopes in plating. In the January 1950 issue of *Metal Finishing* a method is described where, by tagging either trivalent or hexavalent chromium ion in a bath with radioactive chromium 51, it was shown that metallic chromium is deposited out of the bath from the hexavalent state. It was felt that an early acquaintance with such ultra modern techniques as applied to the solution of plating problems would furnish a desirable interest stimulus for what would

**Number of nights devoted to topic including demonstrations and laboratory periods.*

Students are shown at left working in the school laboratory.

(*Photo courtesy Frank Briganti*)

ordinarily be considered "dull" matter by an average shop employee.

Tank capacity calculation was next considered, followed by the subject of specific gravity. Salt (NaCl) solutions of 5, 10, 15 and 20% concentrations were prepared in the laboratory, and the specific gravity of each concentration was determined with a hydrometer. Sodium chloride was used for convenience. The students compared their results with the data in a chemical handbook. The specific gravity of metallic copper and aluminum was determined by the use of a beam balance. This experiment was supplemented by having the students plot a graph from the salt solution data, using specific gravity and per cent sodium chloride as ordinates. The class thus learned how to construct and interpret values from a graph, a necessity for intelligent reading of modern technical and trade literature. The use of tables for obtaining equivalent values for Baumé scale readings and specific gravity, as well as conversion of specific gravity to such units as grams per liter and pounds per cubic foot, was also discussed.

The practice of recording analytical report data for bath compositions as grams per liter and ounces per gallon in parallel columns made it advisable to introduce the metric system and compare it with other United States units in use. Apparatus calibrated in the metric system, such as a liter flask, a meter stick and several gram weights were shown, together with a quart container, a yard stick and ounce weights, for comparison. Such a visual comparison is more effective than a simple memorization of mathematical equivalents.

The use of "factors" with many of the prepared reagents available for testing and control represents a practice that has become a fetish for many. It was therefore deemed advisable to show the derivation of such "factor" values. One value chosen was the conversion of grams per liter to ounces per gallon by the use of the multiplier 0.134. A solution of one gram per liter may also be expressed as $\frac{1}{28.3495}$ or 0.035274 ounce per liter (one ounce is equivalent to 28.3495 grams). One liter is equivalent to 0.2642 gallon or one gallon is equivalent to 3.7853 liters. The product of 0.035274 multiplied by 3.7853 is 0.134, which is the factor used.

In many analytical procedures, concentrations are expressed in terms of the chemical equivalents of the various substances present in the solution, that is, in terms of normality. Accordingly, tables representing acids, bases and salts of different concentrations (normality) were compiled as a source of reference for the methods of analysis of the plating solutions. The publishers of *Metal Finishing* generously provided *Metal Finishing Guidebooks* for each member of the class, which served as an effective method for following the analytical procedure for the various baths. This practice of supplying *Guidebooks* has continued with every class, and is indicative of the cooperation industry has offered in every instance.

The acid copper sulfate bath was analyzed first, because one method of determining the composition of the bath depends upon the specific gravity of the solution. This value gives the total concentration of copper sulfate and sulfuric acid in grams per liter or ounces per gallon. Tables containing such values corresponding to the specific gravities are available. Titration of the free sulfuric acid with a standard solution of sodium hydroxide would give the amount of sulfuric acid in grams per liter or ounces per gallon. This value subtracted from the total amount would then represent the concentration of copper sulfate in grams per liter or ounces per gallon. The analytical procedure is thus reduced to a standardization and titration. The oxalic acid used for standardization was weighed, since the use of the analytical balance was taken up later in the course. The formula in the *Guidebook* for calculating the sulfuric acid in ounces per gallon uses a factor of 20.8. This procedure was followed in most of the analyses and it was considered advisable to derive this value as an example for such calculations. The formula is represented as $\frac{20.8}{\text{ml. NaOH required for 2.00 grams oxalic acid}}$ X ml. NaOH required for sample of solution equals H_2SO_4 in ounces per gallon.

Proof

A. Standardization of NaOH

$$N_{NaOH} = \frac{\text{wt.}}{\text{ml.} \times \text{me.}} = \frac{2.00}{\text{ml.} \times 0.063}$$

B. Titration of H_2SO_4

$$\text{ml.} \times N \times \text{me} = \text{wt. (gms.) } H_2SO_4 \text{ in 10 ml. sample}$$

$$\text{ml.} \times \left\{ \frac{2.00}{\text{ml.} \times 0.063} \right\} \times 0.049 = \text{wt. (gms.) } H_2SO_4 \text{ in 10 ml. sample}$$

$$\text{ml.} \times \left\{ \frac{2.00}{\text{ml. NaOH required for 2g oxalic acid} \times 0.063} \times 0.049 \times \frac{1000}{10} \times 0.134 \right\} = H_2SO_4 \text{ oz./gal.}$$

$$\text{ml.} \times \left\{ \frac{20.9}{\text{ml. NaOH required for 2.00 grams oxalic acid}} \right\} = H_2SO_4 \text{ oz./gal.}$$

Analyses of chromium, nickel and silver cyanide baths followed. For the chromium bath, chromic acid (hexavalent chromium) and trivalent chromium determinations were made. The sulfate determination was not made, as this is a gravimetric procedure and was given later in the course. Inasmuch as the titration for the chromium ions involves oxidation of the trivalent chromium to the hexavalent state or the reduction of the hexavalent chromium ion to the trivalent state, these reactions, it was explained, represented a process in which an electron transfer takes place. The substance giving off electrons is oxidized and the substance taking up electrons is reduced. For methods of determining iron, copper, zinc, nickel and aluminum in chromium plating baths, reference was made to an article in the February 1950 issue of *Metal Finishing*. The students did not make these analyses, but the methods were reviewed and discussed by the class.

Hydrolysis, pH, and buffers are important factors in the control of a nickel plating solution. The use of boric acid as a buffer in nickel baths operating at a pH of about 5 and the removal of iron and copper by increasing the pH of the solution, causing the salts of these metals to hydrolyze and precipitate as hydroxides or basic salts at a lower pH than nickel hydroxide, was the basis for several demonstrations. Solutions of several salts were tested with litmus to show the influence of the ions of soluble salts on the pH of water. An effective demonstration of buffer action in nickel solutions was obtained from the text "*Principles of Electroplating and Electroforming*" by William Blum George B. Hogaboom. A Beckman pM meter with glass electrode was used to study the change in pH during the titration. Solutions of normal nickel sulfate and also of normal nickel sulfate containing half molar concentration of boric acid and varying amounts of sodium fluoride were titrated with 0.2N sulfuric acid and sodium hydroxide.

In the analysis of the nickel plating solution the *Guidebook* introduces the use of a factor in calculating the weight of a salt when the weight of metal is known. The factor of 4.05 for nickel chloride was calculated. Metallic nickel $\times$ 4.05 = nickel chloride (crystal).

Proof

$$\text{wt. Ni} \times \frac{\text{Ni}}{NiCl_2.6H20} = \text{nickel chloride (crystal)}$$

$$\text{wt. Ni} \times \frac{237.70}{58.68} = \text{nickel chloride (crystal)}$$

$$\text{wt. Ni} \times 4.05 = \text{nickel chloride (crystal)}$$

An article on "*The Determination of Impurities in Nickel Plating Solutions*" that appeared in the May and July 1950 issues of *Metal Finishing* was shown to the class as a source of information. All of these references to the trade literature were introduced to show the students how a careful reading of such literature could be of practical, daily benefit.

The topic of complex compounds was introduced before proceeding with the analysis of the silver cyanide bath, since practically all silver plating is conducted in the cyanide bath. Several demonstrations were performed with silver and copper to show complex formation. The wide use of complex compounds in a great majority of the processes in the plating

At right is a typical classroom scene at Brooklyn Tech.

(*Photo courtesy Frank Briganti*)

industry was well described in another trade journal article,[2] published in the July and September 1950 issues of *Metal Finishing*. This article also served as the basis of class discussion. The major functions of complex compounds were discussed, as well as examples of the use of complexes in copper, nickel, zinc and alloy plating. Another phase of the class discussion of complexes related to the role of chelating agents in the plating industry. This subject was discussed by *Mr. Walter A. Raymond* as a guest lecturer. A number of the members of the class attended a lecture on this subject at an *American Electroplaters' Society* meeting in New York, and reference was made to an article on "chelating agents" in *Metal Finishing*, March 1952. Several members of the class have since reported use of these agents in alkaline cleaner baths.

The analysis of the silver cyanide bath provided occasion to stress the toxicity of a cyanide bath unless proper precautions are exercised. In this connection also, the methods of oxidizing the cyanide solutions before disposal were discussed.

A number of experiments were performed to study the measurements of voltage, current and resistance in series and parallel circuits. The application of Ohm's law to problems relating to current control of plating tanks was taken up. Arrangements of plating tanks in series and in parallel were shown diagrammatically. The study of electrochemical equivalents, current density and current efficiency followed. Several values chosen from the table of electrochemical equivalents, such as thickness of metal deposits, were calculated.

Following the study of analytical methods, testing of electrodeposits was introduced. The measurement of the hardness of the plated surface was demonstrated to the class in the Strength of Materials Laboratory. Chemical tests, such as the dropping test for the estimation of thickness of zinc on steel and the spot test for determining the thickness of chromium, were performed in the laboratory. For the chemical test procedures students were given copies of the pamphlet "*Specifications and Tests for Electrodeposited Metallic Coatings*," an offiicial publication of the *American Society for Testing Materials*.

In the second year of study the principles of gravimetric analysis were introduced. Determination of sulfuric acid in a chromium bath by the precipitation and weighing of barium sulphate was performed by the class. This was followed by current efficiency determinations with a copper coulometer and the study of plating solutions by the use of the Hull cell. Classroom discussion on the subject of deposition and corrosion of metals followed, including such factors as concentration of electrolyte, temperature, presence of colloidal matter, and nature of basis metal. The latter included the topics of throwing power, passivity, deposition potentials. Several demonstrations showing consecutive discharge of anions, decomposition voltage of aqueous solutions, polarization, throwing power and chemical passivity were performed.

Guest lecturers were included so that members of the class could benefit by the discussions of leading men in the field on their specialties. The question period following the lecture gave them the opportunity to discuss the practical problems experienced in their work. The fact that the course is limited to those employed in the plating industry brought a ready response to the invitation to appear as guest lecturer. Such men as *Mr. Walter H. Prine*, of International Nickel Company; *Mr. Walter A. Raymond*, former Editor of Metal Finishing; *Mr. Martin Maher*, of Oakite Products, Inc.; *Mr. George Schore*, Secretary-Treasurer of the New York Branch of the *American Electroplaters' Society; Mr. E. C. Rinker*, of Sel-Rex Precious Metals, participated enthusiastically and showed a keen interest in the program.

It was logical to associate such talks with published articles in the plating journals or lectures before the *American Electroplaters' Society*. The interest that the class showed in these lectures was reflected in the frequent reference to articles appearing in the plating industry journals and the increasing number of the class attending the meetings of the society. Many are now members.

The benefits of the course may be estimated in terms of some of the comments by the class members: "a better understanding of problems;" "a quicker approach to the solution of a problem;" "a better appreciation of new developments and the ability to adapt new methods;" "ability to interpret analytical reports;" "experience in looking up information;" "better laboratory technique." Several members have already bettered their positions. On the basis of the discussions on chelating agents, one enterprising member of the class wrote to one of the companies and introduced a chelating agent in his commercial nickel, Watts' type, bath. This resulted in a smoother deposit and gave better throwing power. What to him was the greatest source of satisfaction was the typewritten report of the results he proudly submitted to his superiors. Another member, supervisor in a plating room, persuaded the owner of the plant to spend more than one thousand dollars for laboratory equipment and control units for the plating tanks. The owner's reluctance to make such expenditures kept dwindling as results continued to show the benefits of better control due to these improvements. This member finds satisfaction in meeting the technical representatives as they visit his plant and intelligently discusses points which previously were not clear to him.

The significance of such a project is revealed in the earnestness of these men who are striving to improve their technical training so that they will be better prepared to keep pace with the scientific developments in the plating industry. An awareness of the source of essential information and the ability to understand and appreciate changes has established for these students a degree of confidence which becomes more evident as they continue their studies. This is one of the most compelling reasons for support of adult education.

The development of this program can be attributed, in a large measure, to the encouragement of *Mr. James Striffler*, Teacher-in-Charge of the Brooklyn Evening Technical High School, whose efforts to promote adult education have been one of the salient factors for the place of prominence the school occupies in this field. The purchase of equipment and the plans for expansion for the course in electroplating would not be possible without his continued support and the enthusiastic approval of *Mr. Samuel Schenberg*, Coordinator of Evening High Schools.

A Metal Cleaning Test Using Radioactive Stearic Acid as Soil—Part II

By J. W. Hensley, H. A. Skinner, and H. R. Suter, *Wyandotte Chemicals Corporation, Wyandotte, Michigan*

Cleaning Test Procedure

THE cleaning test was kept as simple as possible during this initial work, and consisted simply of immersing the soiled disc for a measured time, without agitation, in a fixed volume of cleaning solution held at a constant temperature of 90°C., and then rinsing at room temperature. The assembly used is shown in Figure 5. The cleaning vessel was a 200 ml. electrolytic-type beaker, which during a test was supported in a constant temperature bath. The disc was supported in a vertical position by means of a small magnet in a glass tube, the latter passing through a hole in a cover glass and held in place with a Teflon gasket. Evaporation loss from this type assembly was found to be negligible in periods of up to half an hour at 90°C.

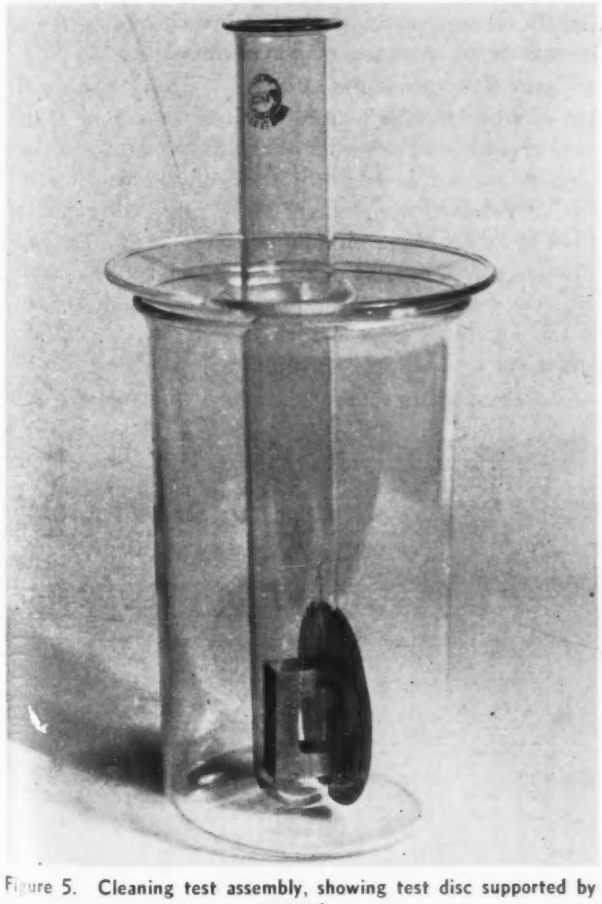


Figure 5. Cleaning test assembly, showing test disc supported by magnet.

It was found to be desirable to preheat the tube and magnet support in boiling water before a test, as otherwise absorption of heat from the cleaner solution lowered the temperature appreciably. Cleaner solution volume was 100 ml, and each portion of solution was used for two duplicate discs and then discarded. All solutions were prepared with distilled water. After removal from the cleaner solution, test pieces were rinsed at room temperature, by dipping 10 times, in a standardized manner, in each of two 50 ml portions of distilled water. Each portion of rinse water was used for one test disc and then discarded.

Measurement of Radioactivity

A general view of the apparatus used in the measurement of radioactivity is shown in Figure 6. It consists of a thin-window *Geiger* tube in conjunction with a *Raychronometer* automatic scaler. The *Geiger* tube is contained in the lead shield assembly shown at the right. The disc to be counted fits in a support as shown, which slides under the window of the *Geiger* tube, with the surface of the disc about 0.1 inch from the window. The counting geometry of this assembly is highly reproducible, and for relative comparisons, no corrections need be made except for the subtraction of background count. In counting at low levels of activity (200 c.p.m. or less) a minimum of 3000 counts were collected, to give a standard deviation of about 2%. At higher levels, a minimum of 10,000 counts were collected, for a standard deviation of about 1%. Background was determined at least twice a day, and periodic counts were taken on a standard C-14 source to detect any change in tube characteristics.

Sensitivity of the Test

In general, it might be said that an activity of about five counts per minute above background can be detected readily, without prolonged counting. Since 34 micrograms of uniformly distributed tagged stearic acid gave 4100 counts per minute, 5 counts per minute would be equivalent to 4×10^{-8} gm. of soil distributed uniformly on the 1½ in. disc, or 4×10^{-9} gm. per sq. cm., which can be considered to be the practical (though not ultimate) sensitivity of the method using this particular tagged soil. No accurate estimate can be made of the counts per minute corresponding to a monomolecular layer of stearic acid

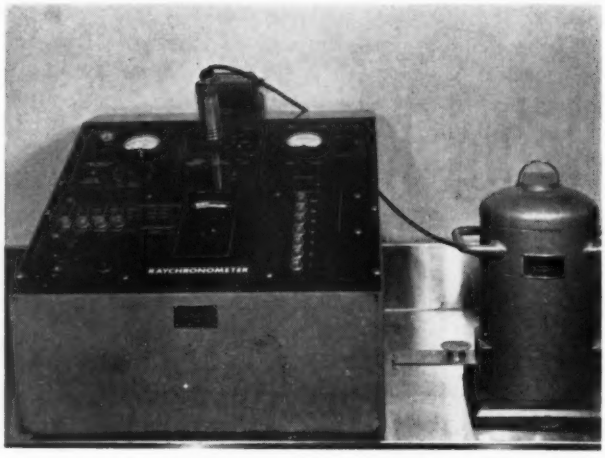


Figure 6. Counting equipment used in measuring radioactivity on test pieces.

without knowing the actual effective surface of the metal disc, and this has not been determined. If it is assumed that the effective surface is equal to the macro surface, and that the area occupied by each stearic acid molecule would be 25 sq. A, then a monomolecular layer would be equivalent to 2 micrograms uniformly distributed on a disc, and this would give 246 counts per minute. Actually, because of the increased surface area of the metal resulting from abrasion, a monolayer might give a considerably higher count; but at least this figure gives a basis for visualizing the amount of soil involved.

Cleaning Test Results

The effect of cleaning time in the removal of stearic acid films from steel is illustrated in Figures 7 and 8. These comparisons were all made with discs prepared, before soiling, by the hand-polishing method, and the data in the two graphs are comparable. Each point represents the average for at least duplicate determinations, and counting rates shown are net values — that is, they have been corrected for background count. Cleaning at any specified time was continuous; a coated disc was used in only one test, and not reimmersed to provide data for a longer cleaning time. The tetrasodium pyrophosphate, trisodium phosphate (12 hydrate), and sodium metasilicate (5 hydrate) were of commercial grade. The sodium carbonate and sodium hydroxide were of CP grade.*

*See appendix for specifications on alkalies used.

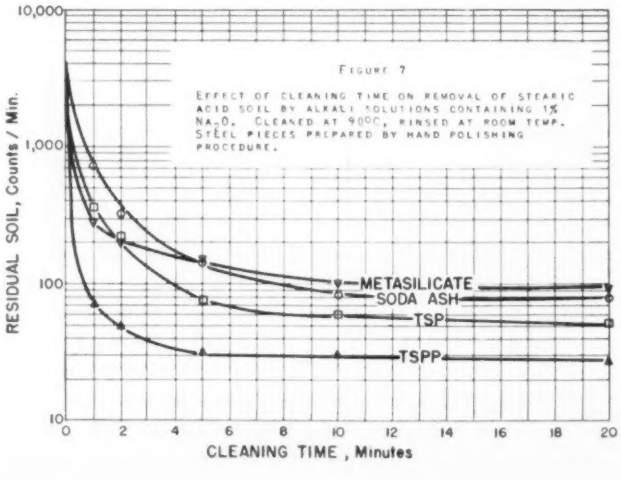
It is apparent from Figure 7 that there was a distinct difference in the action of these four common alkalies, and the difference was especially pronounced with short cleaning times. After one minute of cleaning, soda ash left about ten times as much soil as did TSPP. The difference became less with increased cleaning times (in terms of quantity of residual soil — note the logarithmic scale) but with prolonged cleaning, TSPP still produced appreciably cleaner pieces than did the other two alkalies. Each cleaning solution apparently reached an equilibrium value in terms of residual soil, and under these cleaning conditions, all of the solutions reached this equilibrium within ten minutes, and continued cleaning had little or no effect.

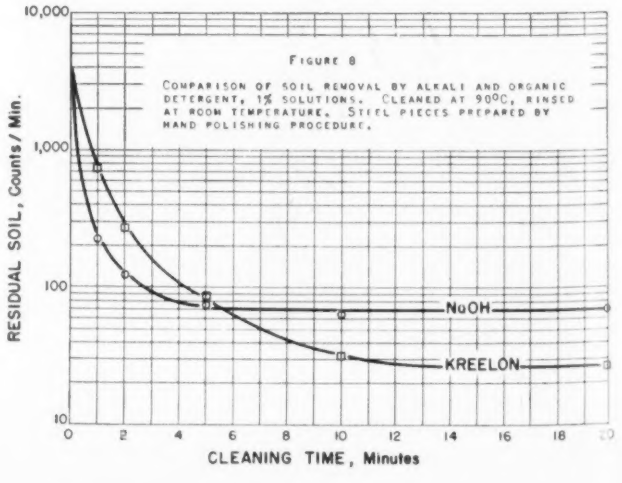
It often has been assumed that removal of a fatty acid soil would depend largely on saponification, and that therefore the more strongly alkaline, or the higher the pH of a cleaner, the more effective it should be. These results contradict this assumption, as the alkali with the lowest pH gave the best results. Caustic soda solution (curve shown in Figure 8) also was distinctly inferior under these specific conditions to the less alkaline TSPP. It is apparent that some mechanism other than saponification is important in the removal of this type of soil.

These curves (Figure 8) illustrate the importance of the cleaning time selected in comparing cleaners. If comparisons were made with only five minute cleaning periods, the metasilicate and the soda ash solutions would give the same results, but it is apparent that the initial rate of removal by metasilicate was considerably more rapid, and at one minute, more than twice as much soil remained on the piece cleaned in soda ash. On the other hand, the soda ash solution produced slightly cleaner pieces than did metasilicate with immersion times in excess of five minutes.

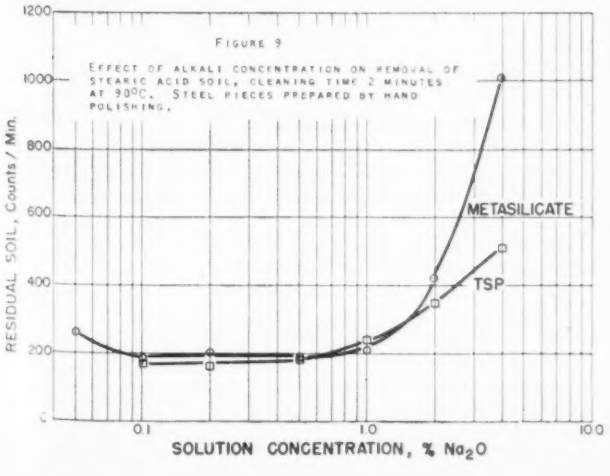
Figure 8 compares the action of a strong alkali with that of an essentially neutral synthetic detergent of the alkyl arylsulfonate type. Although the Kreelon solution removed the soil more slowly than did the caustic solution, it removed appreciably more soil with cleaning times in excess of six minutes. In fact, the 1% Kreelon solution, containing 0.4% active agent, produced cleaner pieces with the longer cleaning periods than did any of the alkalies except TSPP, which gave essentially equivalent results.

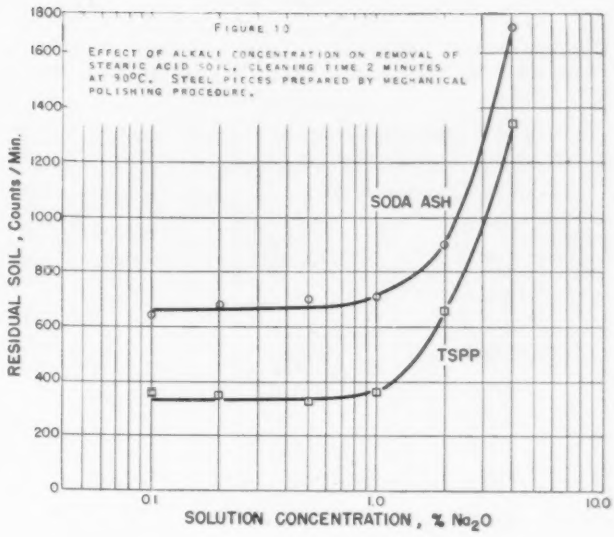
The cleaning-time tests, discussed above, were run





with alkali concentrations calculated to give 1% Na_2O in solution, and the questions arises as to whether this was the most suitable concentration for such comparisons among alkalies. To determine this ,tests were run in which the cleaning time was kept constant, and the solution concentrations varied. Results are given in Figures 9 and 10. It should be noted that residual soil values (counts per minute) in Figure 9 are not directly comparable with values in Figure 10, as different methods were used in the surface preparation of the test discs. The hand-polished discs used in obtaining data for the metasilicate and TSP curves (Figure 9) gave relatively lower residual soil values than the machine-polished discs used for the soda ash and TSPP curves (Figure 10). A short cleaning time of two minutes was selected for these tests in order to gain an indication of the initial cleaning rate, as it was felt that concentration might have a larger effect on the rate of removal during the first minute or two than it would have on the equilibrium residual soil value reached with longer cleaning (this point has not been verified as yet). The curves show that under these test conditions, variations in alkali concentrations over the range 0.1 to 1.0% Na_2O had no appreciable effect on cleaning results, but that increase in concentration above 1% Na_2O caused a rapid loss of cleaning efficiency. It is interesting to note that all four of the alkalies showed the pronounced break in the curve at aproximately the same point, and it appears that available Na_2O concentration, rather than molar concentration, is the controlling factor. Some such effect as this can be expected in the removal of stearic acid by alkaline solutions. *Hazel* and *Stericker*[4] in the work previously mentioned, reported poor removal of stearic acid by sodium metasilicate solutions containing more than 0.6% Na_2O. However, their conditions were distinctly different, as they were using relatively heavy deposits of stearic acid, observing gross removal by visual observation, and much higher concentrations of soap (resulting from saponification of the soil) were involved. It is perhaps surprising that such a pronounced effect would be observed in these tracer tests, where the soap concentration in a bath, assuming complete saponification of the stearic acid, would be on the order of 0.000036%. It was thought that a film effect might be involved, accentuated by the lack of agitation, and some tests in concentrated alkali solutions were tried with moderate agitation, provided by raising and





lowering the test disc slowly in the cleaner solution, but results were essentially the same as in tests without agitation.

The relative smoothness of the curves that have been obtained would indicate that the reproducibility of these tests was good in relation to the differences between cleaners and in relation to the concentration effects. To provide more specific information on the reproducibility that might be expected, series of replicates were run under constant conditions, with the same degree of care normally employed in tests, except that somewhat longer final counts than usual were taken in order to reduce the probable counting error to less than one percent. Table I gives a series of 10 consecutive replicates, run with 2 minute cleaning times in a TSP solution containing 1% Na_2O, at 90°C. In this series, the hand polishing procedure was used in preparing discs before they were soiled. A fresh portion of cleaning solution (100 ml.) was used for

Table I

Reproducibility of Cleaning Tests on Steel Test Pieces Prepared by Hand-Polishing Before Soiling

Cleaning Solution: TSP, 1% Na_2O
Cleaning Time: 2 min.
Cleaning Temp.: 90°C.

*Initial Counts/Min.**	*Final Counts/Min.**	*Deviation from average—c/m*
4110	250	38
4040	325	37
4150	307	19
4120	272	16
4140	305	17
4010	280	8
4150	284	4
4120	300	12
4050	263	25
4180	295	7
Averages	288	18.3
Maximum Deviation		13.2%
Average Deviation		6.3%

*Gross counts, not corrected for background.

Table II

Reproducibility of Cleaning Tests with Steel Test Pieces Prepared by Mechanical Polishing Procedure Before Soiling

Cleaning Solution: Sodium carbonate 0.5% Na_2O
Cleaning Time: 2 min.
Cleaning Temp.: 90°C.

*Initial Counts/Min.**	*Final Counts/Min.**	*Deviation from average—c/m*
4200	735	18
4060	750	33
4200	730	13
4180	674	43
4150	720	3
4260	745	28
4200	705	12
4050	677	40
Averages	717	23.8
Maximum Deviation		6.0%
Average Deviation		3.3%

*Gross counts, not corrected for background.

each two test pieces. Table II gives a similar series of 8 consecutive replicates run in sodium carbonate solution containing 0.5% Na_2O, with 2 minute cleaning times. In this series the mechanical polishing procedure was used in preparing the discs. The average deviation of 3.3%, and the maximum deviation (from the average) of 6% were surprisingly low values for this type of test, and must have been to some extent fortuitous.

Discussion

We consider the results obtained so far in this work to be promising, and to justify further investigation of tagged stearic acid as a metal cleaning soil. It is apparent that the future studies can take a number of different lines, aimed not only at development of a practical performance test, but also at obtaining basic information on the mechanisms involved in the removal of fatty acid soils from various types of metal surfaces. It will be of interest to have information on the action of additional alkalies, surfactants, combinations, and commercial compositions, and to determine the removal of the fatty acid by other cleaning procedures, including solvents, emulsions, and electrocleaning. Because of the nature of the soil and the sensitivity of detection, this method is perhaps best adapted to electrocleaner studies, as it is there that we normally are concerned with removing the last traces of soil. Also, the removal of the thin film of tagged stearic acid may correlate well with the removal of the residual film of buffing compound, which normally is done by electrocleaning.

There is no particular advantage at this point in the work in attempting much correlation between the test results and practical cleaning results. We have experimental results only for single-component cleaning solutions, which normally are not used in actual cleaning operations, since compounded cleaners almost invariably give better over-all results. It will be of interest to see whether the removal of stearic acid soil by commercial compositions will correlate to any extent with the known performance characteristics. In a general sense, some correlation of the present data with practical results can be seen. The relative efficiency of TSP is generally supported by practical observations, and its effectiveness may be related to its solubilizing action on steel and iron, which has been observed in practice. Also, the deleterious effect of excessively high cleaner concentration has been observed on occasion in practice.

A factor of importance in metal cleaning is the redeposition of soil from the cleaning bath, and this may be involved in the apparent different equilibrium values reached in the removal of stearic acid by different cleaners. This factor can be investigated very readily with the tagged soil by immersing clean test pieces, and also pieces soiled with inactive stearic acid, in cleaning baths contaminated with radioactive soil. Some brief, preliminary trials have been made, with indication that there is some pickup even at extremely low soil concentration.

Summary and Conclusions

1. Reproducible and relatively simple procedures have been developed for a metal cleaning test employing radioactive stearic acid as a standard soil.
2. It has been found feasible to apply very thin, uniform stearic acid films of known and controlled weight to metal test pieces by a procedure suitable for routine use.
3. The removal characteristics of stearic films on steel have been found to be very sensitive to the finish of the surface to which applied, and a mechanical abrading process has been worked out which appears to give reproducible results.
4. With suitable surface finishes, distinct differences can be demonstrated in the removal of stearic acid from steel by various single-component cleaning solutions.
5. Cleaning tests have been made with five of the common alkalies, and with Kreelon 4D, demonstrating the effect of cleaning time on removal of stearic acid soil by solutions of fixed concentration. It has been found that in a given cleaning solution, the amount of residual soil on the metal tends to reach an equilibrium value which is not reduced by more prolonged cleaning.
6. It has been demonstrated that, with a cleaning time of 2 minutes at 90°C., concentration of the alkaline solutions tested has no appreciable effect on removal of stearic acid over the range 0.1-1.0% Na_2O, but that an increase in concentration above 1% results in a very rapid increase in residual soil on the piece.

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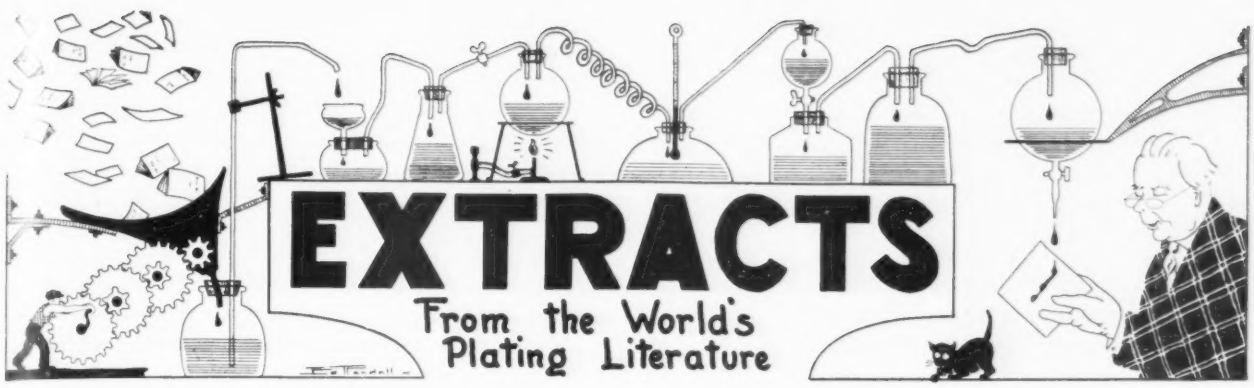


Improving Efficiency of Steel Pickling Processes

F. von der Heide: *Stahl und Eisen*, vol. 71, No. 22, pp. 1148-55.

In conducting pickling operations there exist perfectly clear relationships between acid, metal and the scale and these in turn can be governed and influenced to a considerable extent by the operating conditions employed. Pickling procedure should be a combination of practical experience associated with scientific knowledge. In general it is accepted that oxide compounds (i.e. scale) on the steel of the non-alloy and low alloy steels are acid soluble without difference.

Regarding the choice of hydrochloric or sulfuric acid for pickling steel, the following can be said: Hydrochloric acid dissolves the iron oxides more readily than does sulfuric acid. The pickling effectiveness at 20°C. is quite satisfactory. Increasing the acid concentration reduces the pickling time considerably; thus, doubling the free acid content from 5 to 10% by weight, reduces the pickling time from 55 to 18 minutes. Higher acid concentrations than this reduce the pickling time to a lesser extent.

The temperature of a sulfuric acid bath exercises considerable influence on the pickling time. With sulfuric acid, the action of the bath is partly chemical and partly mechanical. The action extends right to the metal base and the scale is forced off by the subsequent hydrogen generation. With hydrochloric acid pickling baths the iron salts formed have the disadvantage that they attack the base steel. On the other hand, with sulfuric acid baths, the bath action is assisted in a favorable manner by increasing the scale solubility with elevated temperatures. Increasing amounts of iron sulfate in the bath also facilitates the solution of the scale. Savings in pickling acid, pickling time and operational costs and equipment can be achieved by the following measures: (a) By mechanical prehandling of the ware by which the scale layer is loosened, broken and partially knocked off; (b) Swing agitated pickling by which, in addition to a good bath mixing effect, a washing away of the dissolved scale is obtained; (c) Controlled maintenance of the correct bath operating temperature; particularly when fresh ware to be pickled is being introduced into the bath; this is obtained by preheating the ware in a hot water bath before introducing it into the pickling bath; (d) Complete utilization of the bath acid. This is obtained by installing a system of multiple tanks so that by passing the ware progressively through, the first entry can operate with a low free acid content without affecting the overall pickling time. These preliminary tanks serve to make the scale friable and prepare it to a suitable condition for the pickling tanks proper. This, in conjunction with spraying with high pressure water jets before passing to the correct acid strength tanks, will be found to assist the pickling process enormously and to a surprising extent. (e) Utilization of the drag-out acid, by giving the first rinse in a tank with no running water. The solution from this tank can serve as make-up for the pickling tanks. A combined pickling process is recommended for best results: first to pickle in a sulfuric acid bath, then to spray rinse with water and finally, to finish pickle in hydrochloric acid. The real scientific function of pickling should merely be to have sufficient effect to loosen the scale which can then be removed mechanically.

Hard Chromium Plating of Piston Rings for I. C. Engines

G. Mohr: *La Metallurgie*, vol. 84, No. 2, pp. 119-120.

Hard chromium plating of piston rings is already achieving extended application; the principal objective is to afford protection to the upper ring, termed the combustion ring. Reasons for the decrease in wear of chrome plated rings are because of the hardness of the chromium, which attains 700 Brinell as against 230 to 280 for cast iron rings. Finally, the hard surface of the chromium does not produce small particles during the functioning which could act in an abrasive manner as does a cast iron ring. Consequently, protection is given to the engine cylinder surface by virtue of the absence of abrasion. The chromium coating also has a much better heat resistance than has cast iron, of considerable importance for I. C. engine applications. Thus, the melting point of chromium is 1,765°C., as against 950°C. for cast iron.

Recent tests have served to show that for 4 stroke engines, the plating thickness of the hard chromium is sufficient when it attains 0.07 to 0.09 mm. and these tests showed that the reduction in wear of the piston rings was ½ to ⅓rd as compared with the non-plated piston rings. A special case is provided by diesel engines and here a thicker coat of chromium is usually given, on the average generally 0.10 to 0.15 mm. thick.

With normal I. C. engine operation, an auto-sealing

effect is usually obtained during the running-in of the engine. This running-in period and its final required effect is more difficult to achieve with chrome plated rings. The reason for this is that the engine cylinders are not always geometrically round and are more or less ovalized. To overcome this, trapezoidal shaped piston rings are used for the chrome plating; the upper face is not parallel to the lower face but inclined at an angle of 7 to 10 degrees. Current practice in America is for this inclination to be 7° and in England 8°. The technical advantage of trapezoidal rings is that they do not allow the accumulation of coked oil at the upper face, which reduces the possibility of blocking of the rings.

The wear resistance of chrome plated piston rings is not only governed by the thickness of the chromium coating but also by its molecular adhesion to the base metal. It is of vital importance that the chromium coating adhere well to the piston ring metal as, if the chromium becomes detached at any point, the ring becomes useless. What is more serious, the piston and the rubbing surfaces of the cylinder wall can be ruined in the process. For four stroke engines, chrome plated piston rings no longer present any fundamental drawbacks, but their employment for 2-stroke engines requires critical, detailed attention. However, non-plated piston rings for 2-stroke engines also give rise to more difficulties than for 4-stroke engines. Because of the scavenging effect of the exhaust with 2-stroke engines, lubrication difficulties are more pronounced both with non-plated than with plated rings. Engine design is of outstanding importance in this connection.

Field tests with chrome plated rings have been so favorable that the Benz and Daimler engine concerns have standardized on chrome plating practice. The Humbold engine concern have similarly standardized on chrome plated piston rings for their water-cooled diesel engines. All this indicates that early difficulties have now been largely overcome.

Oxidation Speed and Crystal Structure of Anodic Oxide Coatings

J. Herenguel and P. Lelong: *Revue de L' Aluminium*, September 1951, p. 316.

Tests, in white light, on a polycrystalline aluminum test piece which was given an anodic oxidation for a short time in a sulfuric acid electrolyte, showed on the surface of every crystal light interference phenomena, depending on the anodic coating thickness and the refraction of the surface skin. It was established that, if the oxidation is conducted in a slow manner, (0.6 micron in 10 minutes), i.e. with a current density of 1.5 amps./sq. dm., the coating thickness on all the crystals was noticeably constant, but with a greater rapidity of anodic oxidation, it was fairly variable on the individual crystals of the base metal.

This dependency of the oxidation speed on the crystal orientation, was investigated on a homogeneous alloy of aluminum of 99.95% purity with 3% magnesium. The metal was oxidized in 10% sulfuric acid (by volume) at 27 amp./sq. dm. for 5 minutes at 20°C.; the metal had been previously carefully electropolished. The oxide coating which formed on every crystal was microscopically measured. With these measurements, it was found that the growth of the oxide coating on the various crystal surfaces, showed a strong anisotropy. The directions (100) correspond to the slowest growth while the most rapid growth was preponderantly grouped in the direction (111). The relative deviations in the growth speeds of the oxide coatings were of the order of 30%. The authors explain this phenomenon by a modification of the aluminum oxide. The speed of oxidation, the nature of the electrolytes and the temperature, play a dominant role and these factors determine the permeability of the aluminum oxide formed during the anodic electrolysis. With the thinner coatings, as opposed to this, the results can approximate those which were arrived at by A. T. Gwathmey, who conducted research on the anodic growth speed on a spherical shaped single copper crystal.

Testing of Anodic Coatings

Metalloberflaeche: vol. 6, No. 3, p. B. 42.

The principle of the measurement of the coating thickness consists in dissolving the oxide layer and determining its weight; the thickness of the oxide coating is calculated by comparison with the theoretical specific gravity of 2.55. To test the continuity of the anodic coating, the piece to be tested is treated as the anode with an aluminum cathode at normal temperature in a solution of 0.25% sodium alizarine sulfate and 10% hexamethylenetetramine. With this test, damaged places in the anodic coating are colored dark red. By using these tests and the consequent production improvement which has resulted, it is stated that with large scale anodizing in Swiss practice, rejects have been reduced to 0.05-0.1 parts per thousand produced.

Nickel Anodes

E. R. Thews; *Metalloberflaeche*, vol. 5, No. 7, pp. B101-B107.

Production of rolled anodes has recently undergone technical development so that the latest trend is for the use of rolled anodes rather than cast. The outstanding technical trend has been the adoption of pure nickel anodes depolarized with nickel oxide. Sinter nickel anodes would also appear to have a distinct future. The nickel powder for the sinter anodes is prepared by the reduction of nickel carbonyl but a development of the German I. G. Farbenindustrie concern makes use of the direct employment of nickel carbonyl for the manufacture of the anodes (German patent No. DRP 624.306). One great advantage of sinter nickel anodes is that the porosity can be controlled so as to give an anode with any desired degree of solubility. A considerable technical advantage of sinter anodes over cast anodes is that the characteristic somewhat high tendency in the latter towards the formation of anode slime can be largely suppressed. Care is necessary when preparing sintered depolarized anodes as account must be taken of the effect of the reduction stage on the addition substances; thus the nickel and sulfur additions could be affected while on the other hand carbon additions are not affected appreciably. Conducting the sintering in a vacuum prevents any adverse effect on these addition substances.

Copper is an impurity found in all types of nickel anodes: the greater part however does not pass into the nickel bath but remains as a crust on the anode. A small part of this copper passes into the slime and a smaller part migrates into the bath. Under unfavorable conditions, for example, at relatively low current densities, copper can give rise to appreciable darkening of the nickel deposit and under some circumstances can lead to spotting-out trouble at recessed parts of the cathode.

Depolarized nickel anodes contain nickel oxide up to a maximum of 1.1%. Up to this point, the oxide forms a eutectic with the nickel; the oxide content usually lies between 0.10 and 0.20% in rolled anodes and between 0.05 and 0.20% in cast anodes. Perfect homogeniety of the oxide containing mixtures is necessary. With oxygen contents up to 0.24% the eutectic structure consists of pure nickel crystals mixed with the eutectic and with perfect homogenization of the structure the solubility is improved. With a heterogeneous structure however, there occurs a preferential solution of the eutectic which has a higher solution potential than pure nickel. If free nickel oxide is present, this forms hard granular particles, insoluble in the electrolyte. These particles are so fine that they may be able to penetrate partly through the interstices of the anode bag. A comparison between carbon-free depolarized anodes and oxide-free carbonized anodes always favors the first type; they corrode more uniformly and give higher anodic current densities.

The role of sulfur as a depolarizing element must be regarded as very obscure. Most of the conflicting statements which have been made on this subject are based on fallacies. Most of the possible sulfides in the nickel anode material are positively harmful. An exception is provided by magnesium sulfide in small amounts. This compound remains distributed inside the crystals as very fine, dark colored particles. Small amounts enhance the solubility of the nickel. The sulfur and oxygen content of anode nickel is limited to 0.002 up to 0.0075%.

Plating Thallium-Lead Alloys from Fluoborate Baths

E. Bertorelle, L. Giuffre and A. Tunesi: *Galvano* (Paris); vol. 20, No. 177, pp. 18-20.

A fine grained alloy deposit containing about 70% lead and 30% thallium was previously obtained by *Fink* and *Conrad* from a perchlorate-perchloric acid bath. The present work covers the deposition of thallium-lead alloys from fluorborate baths. It is well known that lead is easily deposited in a compact form from fluoborate solutions. Preliminary work was necessary to ascertain the correct operating conditions for the simultaneous plating of these two metals in the form of an alloy from fluoborate solutions. To obtain a simultaneous electrolytic deposit of the two metals it is necessary that the curves giving, for each of them, the current density as a function of the cathodic potential in the bath, cross at some point or at least that the projections of these curves on the axis of the potentials meet. Thus, simultaneous deposition of the two metals, impossible at a certain current density, becomes possible at another. The characteristic current density-cathodic potential of lead fluoborate and thallium fluoborate were determined, lead and thallium being used respectively for the anodes and a lead-thallium alloy for the cathode. Operating temperature was 18°C. in all cases. The baths studied contained either 228 g./L. of lead fluoborate or 150 g./L. of thallium fluoborate and a free acidity of 26.7 g./L. of fluoboric acid and with the following additions: (1) No addition; (2) 10 g./L. gelatine; (3) 5 g./L. aloin; (4) 5 g./L. aloin plus 10 g./L. peptone plus 10 cc./L. cresol.

The tests showed that there exists no value of current density permitting, from a simple fluoborate bath, the simultaneous deposition in a constant ratio of lead and thallium. The organic additions have different effects on the discharge potential of the lead and thallium ions; within the scope of the tests conducted, they modified particularly that of lead, approaching the discharge potential to that of thallium. Gelatine was not suitable; the addition of aloin was found to give excellent results. It was found that the simultaneous deposit of lead and thallium in a constant ratio would be possible with a current density of 1.45 amp./sq. dm. Tests in connection with the codeposition of the two metals as an alloy were made in a bath containing the two metals in equi-molecular proportions: Pb: 61.2 g./L.; Tl: 60.35 g./L.; HBF_4: 526.6 g./L.; aloin 5 g./L. A thallium-lead anode was used with 48.4% Tl. A well degreased aluminum cathode was used, from which it was easy to detach the deposit for examination. Current density was 1.45 amp./sq. dm. The deposit was very compact and of a fine grain; analysis showed it to contain 84.4% thallium. This is a greater content than in the anode or bath; if the cathode potential is the same at the current density chosen, twice as many thallium ions are discharged as lead ions.

METAL CLEANING TEST

(*Concluded from page 80*)

Appendix

Specifications on Alkalies Used in Tests

Sodium Hydroxide: Baker and Adamson (General Chemical Division, Allied Chemical and Dye Corp.) Reagent grade, ACS specifications.

Sodium Carbonate: Eimer and Amend C.P. grade, ACS specifications.

Trisodium phosphate twelve hydrate, commercial:

Na_2O to M.O.	16.0-19.0%
P_2O_5	18.3% min.
CO_2 as Na_2CO_3	less than 2.0%
Sulfate as Na_2SO_4	" " 0.75%
Chloride as NaCl	" " 0.65%
Free alkalinity as NaOH	" " 2.15%

Tetrasodium pyrophosphate, commercial:

Na_2O to M.O.	21.8-23.0%
P_2O_5	52.5-56%
Ignition loss	less than 0.3%
Insolubles	" " 0.2%
CO_2 as Na_2CO_3	" " 0.1%

Sodium Metasilicate, five hydrate, commercial:

Na_2O to M.O.	29.2-29.4%
SiO_2	28.2-28.6%

Shop Problems

Abrasive Methods—Surface Treatments—Control
Electroplating—Cleaning—Pickling—Testing

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Making up White Brass Solution

Question: We want to make up a white brass plating bath containing the following:

Zinc (as metal)	4.5	oz./gal.
Copper (as metal)	1.0	"
Total Cyanide	13.5	"
Total Caustic	7.0	"

Can you tell us how much of each material should be used if we start with zinc oxide, copper cyanide, sodium cyanide, and caustic?

S. D. P.

Answer: For making a bath of the above composition you would need 5.63 oz./gal. of zinc oxide, 1.41 oz./gal. of copper cyanide, 11.5 oz./gal. of sodium cyanide, and 1.45 oz./gal. of caustic soda. Space does not permit an explanation for these calculations, and we refer you to *Blum & Hogaboom's* text for additional instruction on such calculations.

Electropolishing of Gold Alloys

Question: We have been attempting to work out a method for electropolishing of small gold jewelry items which are extremely difficult to polish properly by ordinary methods. After much searching of the literature we come to the conclusion that such a process is unknown for gold, or else what results have been obtained have not been published. Can you give us any suggestions as to where references to gold electropolishing may be found?

K. H. J.

Answer: Only two electropolishing baths have been specifically recommended for gold and its alloys, and to the best of our knowledge the process has not been very successful, due to the very slow rate of polishing obtained and the uncertainty of obtaining consistent results suitable for production work.

Kushner recommended a bath made up as follows:

Potassium cyanide	67.5 g.m./l.
Rochells salts	15. "
Potassium ferrocyanide	15 "
Phosphoric acid	22.5 "
Ammonia	2.5 ml./l.

This bath should be kept about 60° C., with a voltage between 9-10 volts. Current density of about 150 amps/sq. dm. are used with vigorous stirring.

A patent was issued to *Battelle* for a gold polishing bath of the following composition:

Sulfuric acid	82%
Phosphoric acid	5%
Chromic acid	.2%
Water	balance

This bath is used at 2.8 amps./sq. dm., at 60°C. Polishing time is approximately ten minutes.

Some work was also reported by *H. Krause* in the German Publication "*Metalloberflaeche*" in January 1949, but we have no details on the bath composition.

Removing Fire Scale From Bronze

Question: I am very much interested in the methods of removal of fire scale from sheet bronze material prior to oxidizing and other methods of finishing. I have tried the nitric acid pickles and the usual bright dips, but would like to know if there are any other methods easier to apply and cheaper to use.

Answer: Bronze can be pickled in a solution of sulfuric acid (½ pint/gal.) to which 2 oz./gallon of sodium dichromate has been added. Heat to 130°F. This will remove most of the scale. Follow with a bright dip to get a good surface.

Purification of Acid Copper Bath

Question: I wonder if the purification of acid copper baths using potassium permanganate to remove organic impurities can be done without heating the bath as is suggested in the Plater's Guidebook. Our bath cannot be heated conveniently and I wonder if this purification can be accomplished at room temperatures.

Answer: The purification of acid copper plating solutions through the use of potassium permanganate can be carried out at ordinary temperatures, but it will take a much longer time for the reaction to complete itself and for the permanganate color to disappear. If the treatment is carried out at room temperature, it would be desirable to leave the solution standing over a week-end after the permanganate has been added in order to interfere as little as possible with production. We would suggest that you try carbon treating first.

Plating Nickel Over Old Nickel

Question: At the present time we are experiencing difficulty plating nickel over old nickel. Is there a method of doing this?

Answer: For electroplating nickel over old nickel, the Wood solution has been very successful. The process involves direct current treatment at six volts at room temperature in a solution containing two pounds of nickel chloride and one pint of hydrochloric acid per gallon. Carbon anodes should be used.

This treatment removes the passive oxide film from the nickel and deposits a very thin adherent coating of fresh nickel. The work can then be rinsed and plated as usual.

Plating on Case Hardened Steel

Question: We are having trouble making our nickel stay on 1010 steel that has been case hardened.

Our cycle is to clean in hot alkaline cleaner, rinse, acid pickle in 10% sulfuric acid at 160°F., rinse, cyanide dip, rinse, then nickel plate in a bath at room temperature operated at pH 5.8, 2.75 oz./gallon chloride, 3.0 oz./gallon

boric acid, 4.0 oz./gallon metal. When these parts are bent, the plate flakes off.

Answer: We assume that no finishing operations is performed on the parts in question prior to plating. Case hardened steel has a surface extremely hard to plate because the coating formed by the quenching operation after case hardening affects the adhesion of any plate applied to it. This coating must be removed by polishing or by wet abrasive barrel rolling.

After removing the surface film, this cleaning cycle will give good results: clean electrolytically in an alkaline cleaner using at least 6 volts, rinse, 10% acid pickle at 150-160°F. regulating the time of pickling so that no attack or carbon smudge will result on the work, rinse, water spray to remove all traces of free carbon, dip in an acidulated nickel salt solution (this dip is 3.0 oz./gallon nickel sulfate and a pH of 2.0 to 3.0), rinse and nickel plate.

Crumbling Anodes

Question: In the annual overhaul of our nickel plating tanks, the anodes have been removed and we notice that many of them are very porous and that pieces as thick as a man's thumb fall off when touched or brushed.

Will you please advise whether or not these anodes should be brushed, in which case a considerable part of them will be destroyed, or would these act satisfactorily if handled carefully, rinsed with water and put back into the solution without further cleaning?

Answer: From the description of the scale on your anodes, it is evident that you are using 95-97% nickel anodes. The scale is largely iron and carbon which were present originally in the nickel as impurities.

It is better to clean off this scale so as to obtain free passage of the current. The small amount of nickel that is lost in doing so cannot be prevented. The action you mention is characteristic of the low purity anodes. The high purity, 99% plus, nickel anodes would not produce such scale.

Chromium Plating Taps

Question: I am interested in learning the method for chromium plating taps and dies. How are the threads kept from getting rough and oversize?

Answer: The practice is to plate only a light coating of chromium on taps and dies. This can be accomplished in a solution made up of 33 oz./gallon of chromic acid and 0.33 oz./gallon sulfuric acid. Operate the bath at 130°F. using 400 amperes per square foot.

A 10 to 15 minute plate in the above bath will add appreciable wear resistance to the pieces and no grinding or loss of dimension of the tool need occur.

When the deposit has worn through, strip off the remaining chromium in a solution of 16 oz./gallon caustic soda, using reverse current at 6 volts. The tool can then be polished up by buffing with aluminum oxide rouge, cleaned and replated.

Zinc Plating Malleable Iron

Question: We have been experiencing difficulty with zinc plating on malleable iron padlock cases. The plate forms very slowly, is thin and is also very dark. We have added ½ oz./gallon of cadmium oxide to the zinc solution.

Answer: It is difficult to plate iron castings in a cyanide bath as considerable gassing results and not much metal is deposited. The explanation is that this is due to low over-voltage of hydrogen on the carbon inclusions in the metal with the results that hydrogen is more readily deposited than zinc.

Your main source of trouble may be due to excessive acid pickling which roughens the surface and aggravates the above condition exposing carbon particles. It would be better to clean the castings by sand blasting and eliminate acid dipping or to limit the acid dip to a quick immersion.

If cadmium added to your bath does not help to cover this material, add a small amount of mercuric oxide to the bath. This will aid greatly in covering this type of metal.

Patents

Recently Granted Patents in the Metal Finishing Field

Plating Barrel

U. S. Patent 2,594,061. *F. E. Newman, assignor to United States Rubber Co.*

A plating barrel comprising a pair of end members forming the ends of the barrel, a plurality of foraminous panels held longitudinally between said end members and forming the sides of the barrel, and a plurality of longitudinal rail members between said panels, said parts being composed of a heat-cured composition comprising a cashew nut shell oil-modiged phenolaldehyde resin convertible to insoluble, infusible form under the action of heat and a hardening agent, a methylene-yielding hardening agent for said resin, a rubbery copolymer of butadiene and acrylonitrile, and diatomaceous earth, the relative proportions being as follows: in said end members and in at least a major proportion of the thickness of said panels from 30 to 40% of said copolymer and correspondingly from 70 to 60% of said resin, and from 30 to 40% of diatomaceous earth; in said rail members from 30 to 45% of said copolymer and correspondingly from 70 to 55% of said resin, and from 30 to 45% of diatomaceous earth; said percentages being by weight based on the sum of said copolymer and said resin.

Automatic Polishing Machine

U. S. Patent 2,594,646. *F. E. Hendrickson, assignor to Bror G. Olving.*

An automatic polishing machine comprising in combination, an endless polishing belt, a plurality of belt-backing work wheels supported in contact with the inside surface of said belt, each said wheel being separately movable toward and away from the belt, means for moving a piece of work along said belt past each of said work wheels in succession, and biasing means for pressing said work wheels against said inside surface of said belt, said means being adjusted to urge each said work wheel against said belt with a greater force than the work wheel succeeding it in the direction of travel of a work piece.

Buff Section

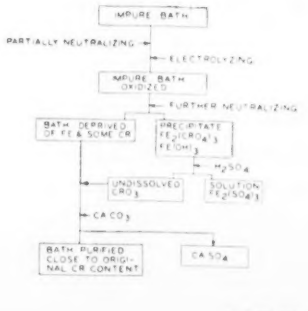
U. S. Patent 2,593,672. *E. W. Hall.*

A buff section adapted for assembly on a spindle side by side with other like sections to form a buffing wheel said section comprising a relatively unyielding center and an annulus of abrading material encircling its periphery and anchored thereto, the center having on its obverse and reverse sides at substantially the same distance radially from the center annular series of spaced axially extending projections, at least outer portions of the projections extending over less than one-half the circumference whereby the projections on the obverse sides of two sections or those on the reverse side may nest with at least partial axial overlapping, the projections on the obverse side and those on the reverse side being differentially spaced to provide circumferential overlapping of projections of two adjacent sections assembled obverse to reverse.

Purifying Chromium Baths

U. S. Patent, 2,600,171. *G. Sagen.*

Method of producing chromic acid solutions substantially free from trivalent chromium and iron from chromic acid baths utilized in the electro-deposition of chromium comprising the treatment of the bath by electrolysis to effect oxidation of trivalent chromium to hexavalent, adding a neutralizing agent selected from the group consisting of alkaline earth carbonates and alkaline earth hydroxides in a quantity sufficient for precipitating the iron of the solution partially in the form of ferric chromate, converting the contents of hexavalent chromium of the precipitate thereby formed into chromic acid anhydride by a treatment with concentrated sulphuric acid, separating the chromic acid anhydride thereby formed from the solution simultaneously formed and adding the chromic acid anhydride to the original solution neutralized with the alkaline earth compounds.



Testing Cleaned Surfaces

U. S. Patent 2,600,221. *E. Domingo.*

The method of examining a surface for visually undetectable organic contamination that includes the steps of treating the surface with an excess of chemical solution that is selectively sorbed by the organic contamination and rinsing the surface to remove the excess solution not sorbed to cause said contamination to become visually evident and distinct from portions of the surface not so contaminated when exposed to an appropriate light band.

Bright Zinc Electroplating

U. S. Patent 2,600,352. *C. J. Wernlund, assignor to E. I. du Pont de Nemours & Co.*

The process which comprises electroplating zinc from an aqueous zinc cyanide solution which contains about 60 grams per liter of zinc cyanide and an alkali metal stannate in amount equivalent to 1 to 2.5 grams per liter of sodium stannate and to which has been added about 3 to 26 grams per liter of a ketone selected from the group consisting of acetone, methyl ethyl ketone, methyl n-propyl ketone, gamma-hydroxypropyl methyl ketone, acetyl acetone, diacetone alcohol, mesityl oxide and cyclopropyl methyl ketone.

Buffing Wheel

U. S. Patent 2,594,812. *L. M. Seelenfreund, assignor to Action Buffs, Inc.*

As a new article of manufacture, a section adapted in conjunction with like sections and a hub structure to form a buffing wheel and comprising a plurality of annular juxtapositioned

fabric layers of U-shaped cross section and with gathered or plaited inner margins around a wire annulus, and a core extending around and serving to secure together the inner margins of the layers and embodying a pair of separate, spaced apart, flat, stamped metal side rings formed of metal stock of such thickness that they are extremely rigid, fitting against and in centered relation with the inner margins of the outermost fabric layers, having flangeless inner margins, and provided on their outer margins with integral, inwardly extending spaced apart teeth in embedded relation with the inner margins of certain of the fabric layers at locations outwards of the wire annulus, and a ring shaped clamping member consisting of a cylindrical base part fitting within the inner margins of the side rings and a pair of flat side flanges projecting outwardly from the side margins of the cylindrical base part, fitting flatly against the outer surfaces of the side rings, having teethless outer margins, and arranged to hold said side rings in clamped relation with the inner margins of the fabric layers, said ring shaped clamping member being formed of metallic stock of such less thickness than the rings that the core after wear of the fabric layers may be readily dismantled by so circumferentially severing said clamping member as to release the side rings for separation from one another and subsequent reuse.

Anode for Chromium Plating

U. S. Patent 2,594,881. *L. G. De Quasie and R. F. Eisenberg, assignors to Rochester Lead Works, Inc.*

A one-piece lead-containing chromium plating anode comprising a relatively wide and thin body portion approximately 3" wide and $\frac{3}{16}$" thick and a single suspending hook portion of the same material as the body portion and of less width than the body portion, the body portion and hook portion having a continuous rib extending endwise and centrally thereof on their front and the body portion having outer ribs extending endwise thereof on its front and spaced from said central rib and from the side edges, the surfaces on said body and hook portions adjacent to the central rib being inclined from said central rib inwardly toward the side edges of the hook portion and toward the outer ribs of the body portion, and the back of the body and hook portions having an arcuate enlargement extending endwise and centrally thereof, the anode having a minimum thickness throughout of approximately $\frac{3}{16}$" and the hook portion being resistant to bending.

Treatment of Aluminum

U. S. Patent Application 619,264. *N. Goldowski.*

Aluminum metal and aluminum alloys are provided with a corrosion-resistant film by subjecting them to the action of liquid water at superatmospheric pressure and a temperature above 100°C., preferably above 150° C. This treatment has to be carried out for at least 10 to 20 hours.

The presence of an oxidizing agent, such as dissolved or dispersed oxygen, chromic acid, alkali metal, persulfates or perborates, is advantageous.

Film formation is expedited by the addition of an electrolyte, such as a chloride, nitrate, sulfate, phosphate, borate, or oxalate.

The pH value of the treating liquid should be below 8, but not lower than 3.

In the case of extruded aluminum and certain other types of aluminum containing additional metals, the addition of a substance which inhibits corrosion during the film formation treatment was found necessary. Suitable corrosion inhibitors are silica (in a concentration of from 5 to 20 p.p.m.) and/or phosphoric acid, sulfuric acid or chromic acid in a concentration ranging from 5 to 100 p.p.m. If silica is incorporated in the form of sodium silicate, the addition of an acid, e.g. boric acid, sulfuric acid, chromic acid, or phosphoric acid, is advisable to obtain a pH value of below 8, preferably between 6 and 7.

The aluminum is preferably cleaned prior to the treatment for film formation, e.g. by etching with sodium hydroxide followed by rinsing with mineral acid and then with water.

Buffing Wheel

U. S. Patent 2,599,785. *B. P. Sax, assignor to Automatic Buff Co.*

A buffing wheel assembly comprising a spindle, a first tubular member slip-fitted over said spindle and coaxial therewith, a second tubular member telescopically slip-fitted over said first member in longitudinally adjustable coaxial relationship, a first flange secured to one end of said first member perpendicular to said spindle having a central aperture through which said spindle extends, a second flange parallel to said first flange secured to the opposite end of said second member also having a central aperture through buffing section supporting means on each flange radially spaced from said tubular members extending toward said other flange and presenting outwardly facing buffing element supporting surfaces, a ring-shaped buffing element having radial air passageways supported between said flanges and having an inner peripheral edge engaging said surfaces in spaced relationship to said second member thus providing a hollow portion for said assembly, at least one of said flanges having aperture means in the area between the central aperture and the annularly arranged means providing an air inlet to said hollow portion, and means on said spindle for clamping said flanges together in secure element-supporting relationship.

Prevention of Corrosion

U. S. Patent 2,598,725. *D. B. Sheldahl, assignor to Sinclair Refining Co.*

Light petroleum distillate fractions into which have been incorporated amounts in the range approximating 0.6 to 4.0 pounds of ammonium mahogany sulfonates on the oil-free basis and 0.4 to 4.0 pounds of morpholine, each per one thousand barrels of petroleum distillate.

Fingerprint Corrosion Inhibiting Compositions

U. S. Patent 2,598,949. *D. I. Walker and E. A. Dieman, assignors to Standard Oil Co.*

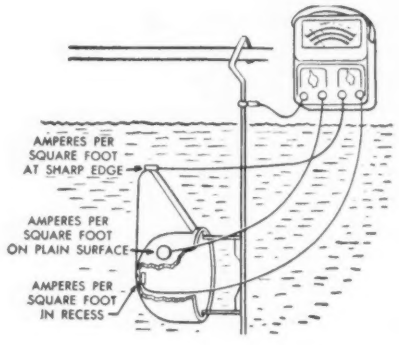
A composition of matter comprising eventually between about 1 and 30% of a preferentially oil-soluble sulfonate between about 5 and 85% of a hydrocarbon solvent boiling in the range between about 100°F. and about 650° F., between about 1 and 20% of a water soluble oxygenated organic solvent boiling below about 180°F. at atmospheric pressure and selected from the class consisting of an aliphatic alcohol and an aliphatic ketone, between about .1 and 5% of a water soluble sulphonated vegetable oil and between about 1 and 10% water.

Recent Developments

New Methods, Materials and Equipment for the Metal Finishing Industries

Current Density Meter

Belke Manufacturing Co., Dept. MF, 947 N. Cicero Ave., Chicago 51, Ill.



Accurate determination of plating deposit at all points on any article, before plating, is made simple, quick and easy by a new type of current density meter announced by the above firm.

Known as the Belke-Kotz Current Density Meter, this new instrument has three test leads for attaching to the surface of the article at three selected places, such as on sharp points where burning may occur, on flat surfaces and in deep recesses. By turning a dial switch on the meter amperes per square foot can be read at each of the test points. Comparing the readings with current density chart for the solution quickly shows whether plating rate is too high or too low at any of the three selected places.

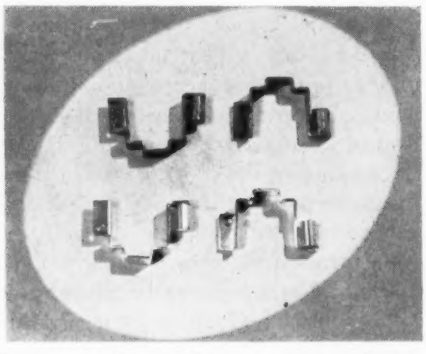
To determine proper racking and proper location of the article in the tank, current density may be read instantly at each of the three points with the article in any position. The need for auxiliary anodes or burning bars, as well as their proper size and location are easily established. The best plating voltage for the specific requirements of the article is readily determined. The meter instantly indicates variations in throwing power of the solution. All need for guesswork is eliminated.

The meter reads in amperes per square foot for direct comparison with standard plating tables without laborious figuring. Nine scales with ranges from 0-3 to 0-3000 amperes per square foot afford sharp reading in any range. Descriptive literature mailed promptly on request to the manufacturer.

New Alkaline Tin-Lead Stripper

Enthone, Inc., Dept. MF, 442 Elm St., New Haven, Conn.

A new alkaline chemical for rapid dissolving of tin, lead and tin-lead alloys has been announced by this firm. This material is used in water in a concentration of 1 lb./gal., and the mixture is heated to from 160 to 180°F. The stripper is stated to rapidly remove tin, lead and tin-lead electrodeposits, heavy solder and hot dipped coatings. Due to the fact that it is alkaline in nature, there is no attack upon



base metals, such as copper, brass, bronze, steel and stainless steels. The material is kept in steel or stainless steel containers and does not deteriorate with age.

The stripping action on both tin and lead is fast and thicknesses of the order of 0.005″-0.010″ are removed in one hour. The product is stated to be suitable for removing of solder from torch or iron soldered pieces as well as hot dipped soldered articles, and unlike acids does not cause any dimensional change in the base metal.

Informative literature is available on request.

Cleaner for Use in Phosphating Line

Detrex Corp., Dept. MF, Box 501, Detroit 32, Mich.

A compound designed especially for use as a precleaner for steel that is to be deep drawn or extruded is announced by this manufacturer.

The compound, Detrex 61, is used in a soak tank at approximately 190 deg. F. at a concentration from 6 to 10 ounces per gallon. It completely removes oil, grease and dirt from all ferrous parts.

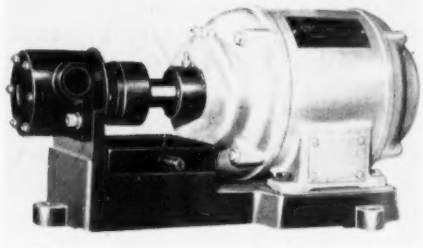
In addition to possessing high wetting and penetrating properties Detrex 61 is very free rinsing. The compound does not contain fatty acids or resin soaps and consequently any entrained solution will not be left with scummy deposits on their surfaces.

Hard Rubber Pump Handles Acids, Alkalies

American Hard Rubber Co., Dept. MF, 93 Worth St., New York 13, N. Y.

The patented Jabsco flexible neoprene impeller pump is now available in hard rubber construction for handling acids, alkalies, and other corrosives at moderate cost. The pump is manufactured by the above company.

Though nominally only ¾ in. in size, the pump delivers 15 g.p.m. at 22 ft. head, or 5 g.p.m. at 72 ft. head. The maximum capacities are 95 ft. head or 16 g.p.m. It pumps viscous or thin liquids. It is resistant to alkalies, solutions of metallic salts, inorganic acids, hydrochloric acid any strength —in fact, any liquid that can be



handled by neoprene, as the hard rubber casing generally is more resistant than the impeller.

The Ace Jabsco pump is self priming. It will start instantly against suction lifts of 6 ft. without a foot valve. When primed, it will handle suction

lifts as high as 14 ft. The self-lubricated flexible neoprene impeller is said to outlast conventional metal rotors and gears; is self compensating for wear. The impeller can be replaced quickly by simply removing the cover plate.

The pump is threaded for ¾" standard pipe threads. It can operate equally well in either direction, reversing flow. Motor is ½ h.p. 1140 r.p.m., polyphase, close-coupled with the impeller mounted directly over the Hastelloy motor shaft. Trouble-free packing.

Top quality, corrosion-resistant hard rubber is used in the molded pump casing, cover plate, gland parts, and drip pan. Base is cast iron painted with acid-resistant paint. Mounting bolts and studs are stainless steel. Shaft, impeller insert and key are made of Hastelloy C.

Forcite Anode Basket

R. O. Hull & Company, Inc., Dept. MF, 1300 Parsons Court, Rocky River 16, O.

Use of scarce, costly anode metals—to the last ounce—is made possible by the new Forcite Anode Basket now available to the plating industry through the above company and its national distributors.

According to the manufacturer, the anode basket is expressly designed for efficient, complete solution of scrap or ball anode material and may be used in nickel, and copper, lead, and all cyanide baths.

Fabricated from reinforced steel, the basket is completely coated with an inert, insulating material. Its tapered construction is ideally suited to give continuous electrical contact to the anode mass *without* requiring re-

placement of "contact" anodes. Contact is made by perfectly shielded, inert graphite blades the entire depth of the basket and coupled to the anode bars.

Cotton bags are included. Forcite Anode Baskets are available in either 24" or 30" lengths, other lengths are available on special order.

Flexible Plastic Tubing

U. S. Stoneware Co., Dept. MF, Akron, O.

Tygon flexible plastic tubing with a triple wire, stainless steel outer braid has just been made available by the above firm. This new form of Tygon tubing was developed to meet the demand for a chemically resistant, translucent, non-toxic, flexible tubing and hose for high pressure applications.

With this braided stainless steel reinforcement, the tubing absorbs vibration more readily and does not crack, leak, or break under working pressures up to and including 300 p.s.i. Because of the flexibility of this tubing less footage is required than with rigid tubing, fewer fittings are necessary, and no special tools are required for installation. It also has the added advantage of being translucent, permitting visual inspection of flow and simplifying cleaning.

Stainless steel braided tubing is stocked in two sizes (¼" ID and ⅜" ID). It's available in six standard formulations and in running or fitted lengths. All fittings are stainless steel. The ¼" ID fittings can be field applied. The ⅜" ID crimped fittings are factory applied. Other sizes of tubing and fittings are available on special order.

Tygon stainless steel braided tubing

is recommended for the high pressure transmission of virtually any liquid, gas, or semi-solid. It is particularly effective in the handling of highly corrosive materials which must be protected from contamination. It can also be used to advantage in high pressure oil or compressed air lines.

Hair Net Visor

General Scientific Equipment Co., Dept. MF, 2700 W. Huntingdon St., Philadelphia 32, Pa.

The GS No. 41 was designed for protection of women workers in industrial plants. Cool to wear, weight is negligible. Available in five colors, white, black, red, green and maize.

Protects the hair all the time. Full, wide back permits easy and complete coverage of the hair. Adjustable to all head sizes—one size simplifies ordering and stocking. The green opaque visor eliminates glare from overhead lighting and reflection from shiny metals, such as aluminum, brass, copper, steel, chrome, silver etc. The visor also relieves eye strain and reduces fatigue. Price $3.00 per dozen.

Corrosion Resistant Chemical

Phillips Scientific Labs., Dept. MF, 23 E. Garden Terrace, N. Arlington, N. J.

A new hydrocarbon chemical, called Mabros, has been developed which prevents corrosion on ferrous and nonferrous metals, whether solid or plated.

It can be used as is, applied by immersion, spray or brush during or after processing, or can be added to paint, varnishes, lubricants, polishes and waxes. Rust and oxidation should be removed first. Technical guidance and sample is available to users by writing to the above laboratory.

Wet Blast Machine

Abrasive Wet-Blast, Inc., Dept. MF, Niles, O.

A new abrasive wet-blast machine for producing refined finishes on production tools is currently being manufactured and stocked for quick delivery by the above company, recently organized by the principals of The Niles Machine & Welding Company together with Mr. Merle H. Jewett, who designed and pioneered this process.

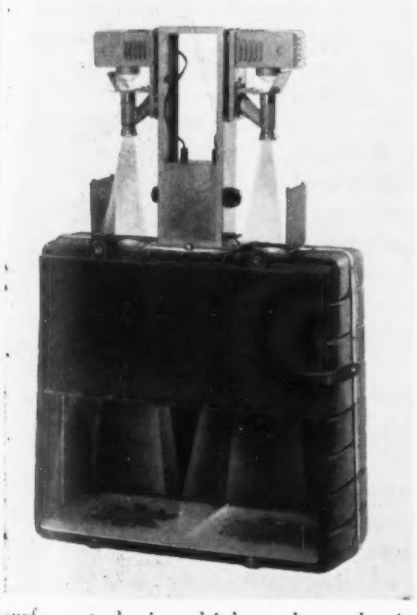
Special abrasives suspended in water, applied by air pressure, is the operational procedure, and it can be quickly taught to any person on actual processing of parts.

Metal removal is negligible, retaining all close tolerances on accurately machined tooling, as action of process, is to procure a refined finish on particular tools selected.

New Faxfilm Surface Comparator

The Brush Development Co., Dept. MF, 3405 Perkins Ave., Cleveland 14, Ohio.

Greater flexibility in use, increased portability and more pleasing appearance are the features of the new Faxfilm Surface Comparator, Model BL-122, now being introduced by this company. Faxfilm is the method of



surface study in which a clear plastic replica of a surface is made in about a minute and projected in a microprojector to show minute details of surface condition with marked three-dimensional effect.

The new Faxfilm Surface Comparator provides comparison projection of

two Faxfilm replicas at 30 diameter magnification. Its principal uses include comparison of work specimens with standard finishes in surface roughness inspection, the comparison of finishes obtained in machinability studies, and comparisons of surface changes in wear and life tests.

The new BL-122 Surface Comparator is 25″ x 12″ at the base and 22½″ high. Including an accessory and file case, carried in the base of the unit, total weight is less than thirty pounds, a reduction of 30% from the Model BL-121 which it replaces. The unit has pleasing, modern design in a warm, maroon synthetic material which combines lightness and unusual strength. The specially designed Faxfilm Micro-Projectors use Wollensak 1″ f:1.9 projection lenses.

For travel use, when comparison projection is not required, one projector may be removed from the large unit and carried in the small accessory case. This would provide a complete unit—materials, working area, file tray, screen and projector — in an 11½″ x 10″ x 4″ case, total weight less than 8 pounds, that could be carried in a suitcase.

A detailed description of the new Surface Comparator may be obtained by writing to the above address.

Abrasive Chips

Roto-Finish Co., Dept. MF, 3700 Milham Rd., Kalamazoo, Mich.

According to an announcement by *C. H. Castle*, Vice-President and Technical Director of the above company, the Roto-Finish abrasive chip line has again been expanded and improved to further expand the applications of the Roto-Finish equipment, materials and processes. The original processes are used for many operations and include grinding, deburring, descaling, polishing, britehoning and coloring all types and sizes of ferrous and non-ferrous parts mechanically on a mass production basis. The processing media is divided into four general classifications. Each type is available in many sizes and often combinations of different sizes are used to produce the desired results. Roto-Finish grinding chips are made of one of the hardest natural materials known and are irregular in shape to maintain continuously active cutting edges for long periods of time. Grinding chips are

used primarily for grinding, deburring, descaling and in some cases for polishing operations. Britehoning chips which are somewhat softer than grinding chips are recommended for light deburring, polishing and britehoning to produce a semi-lustrous finish. Coruloy E chips are a natural fast cutting material and find their greatest application wherever a short time cycle and heavy cut is desired. Coruloy A chips, a manufactured synthetic material, are used for fast deburring, grinding, descaling and polishing, and are usually used when a short processing cycle is more important than operational cost. The different type chips are available in seventeen different sizes ranging from 1/16 of an inch (No. 7) to 1¾ inches (No. 1) in longest dimension. For complete information write the company at the above address.

Floor Patch Material

Dasco Chemical Company, Inc., Dept. MF, Baltimore, Md.

After four years of intensive testing, this firm announces a new fast-setting floor patch material.

This new plastic filler is the only material of its type to contain both metallics and pure rubber latex. It has a strength approximately 250% greater than ordinary floor patch materials. This revolutionary advance is hailed as the answer to todays demands for a material that will easily withstand heavy truck loads common to the modern industrial plant.

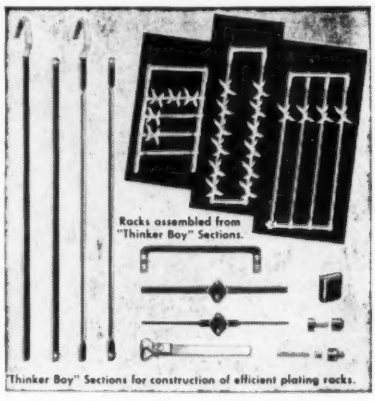
Das-Patch can be applied equally well to wet or dry cement, concrete, asphalt, brick or mastic floor by a single handyman, rather than the usual crew of men which were necessary in the past.

The hole or fissure simply is swept clean and the primer brushed into depth and sides. After this has set for a few minutes, the material is used as taken from the drum and tamped level after the hole is filled. No plasticizer is required. Within five to ten minutes after tamping, truckloads up to twenty tons may be driven over the patched areas without fear of powdering, rolling, or releasing of the patch in any way.

Das-Patch contains no stone or similar aggregates, cement, gypsum, or similar binders. No mixing necessary, no water required, simply use as it comes from the container.

Standard Sections for Easy Manufacture of Efficient Plating Racks

Belke Manufacturing Co., Dept. MF, 947 N. Cicero Ave., Chicago 51, Ill.



"Thinker Boy" Sections for construction of efficient plating racks.

Highly efficient and durable racks for any plating job are easily and quickly made with "Thinker Boy" Sectional Members, announced by the above manufacturer.

Most any style of rack can be made from assorted lengths of the various sections. Design and tip arrangement can be developed by laying the rack sections on a table and placing the articles in position. The manufacturer claims that the rack can be designed, assembled and in use in half the time required to make a sketch for a special rack.

These sections are coated with universal plastic and equipped with Vac-Seal Fittings. Just drilling ¼" holes and screwing the sections together produces a modern, plastic-insulated rack. Variation in design is limited only by imagination and initiative. Frames can be disassembled and the sections re-used or stored in bins. Plastic plugs are available for sealing unused holes.

The "Thinker Boy" sections are furnished in various lengths. The hookless sections may be used as either vertical or horizontal members.

Vac-Seal removable tips, available in hundreds of designs and all sizes, are quickly installed and easily changed for efficient racking of all kinds of articles. Descriptive literature mailed promptly on request to the manufacturer.

Cleaning Solvent

Wayne Chemical Products Co., Dept. MF, Copeland & MCRR, Detroit 17, Mich.

This company announces Kemisol "A", a new and improved chemical

solvent for cleaning. It is claimed to do an excellent job of removing all traces of oil and grease from metal parts. When mixed in a solution from ½ of 1% to 1% with water at approximately 180°F. it offers a thin, inexpensive solution which can be used in almost all methods utilized for cleaning metal parts.

Kemisol "A" is neutral, odorless, non-toxic, non-inflammable, and harmless to human skin. In fact, it is an excellent hand cleaner for the removal of oiliness. It is non-corrosive to aluminum, brass, copper, and most other non-ferrous metals. For information and sample for test, write to the above address.

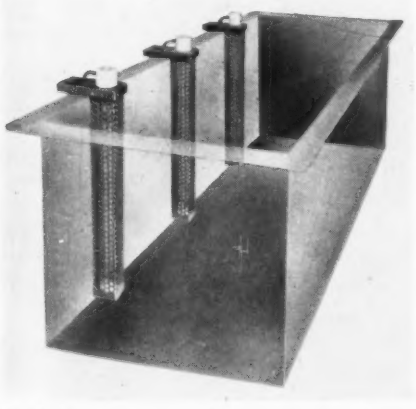
Electric Immersion Heater

Cleveland Process Co., Dept. MF, 7016 Euclid Ave., Cleveland, O.

First of its type to be tested and approved by leading electro-chemical suppliers, the new "Glorod" Electric Immersion Heater overcomes the many problems inherent to the heating of corrosive solutions, according to *F. L. LeFebvre*, Manager of this company.

The "Glorod" introduces a unique type of fused quartz heater, totally inert to acids, which requires no cleaning or maintenance. As one of the best electrical insulating materials known, fused quartz also eliminates "stray" currents in electroplating work.

Thoughtful engineering throughout is said to make it ideal for heating all electropolishing and electroplating baths as well as phosphatizing solutions. A few of the many features out-



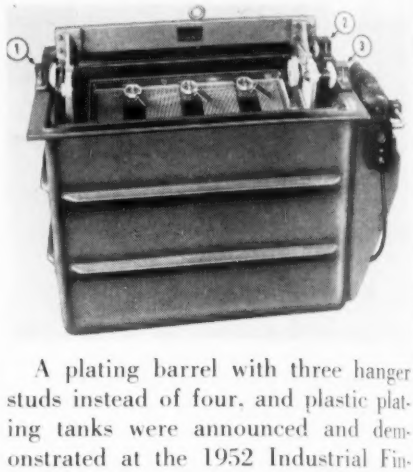
lined by the manufacturer are, functional design, versatility, and lightweight for easy handling in all metal finishing work. Rugged construction provides complete protection against physical abuse. Complete range of

standard sizes are available from stock.

The new Glorod Bulletin containing full information price list and technical details is available upon request.

Three-Point Suspension Plating Barrel and Plastic Tank

Belke Manufacturing Co., Dept. MF, 947 N. Cicero Ave., Chicago 51, Ill.



A plating barrel with three hanger studs instead of four, and plastic plating tanks were announced and demonstrated at the 1952 Industrial Finishing Exposition by the above company.

The improved barrel design has two hanger studs at the drive end and one at the other end. The threepoint suspension is claimed to prevent rocking which ordinarily occurs when plating barrels have two hanger studs at each end.

The plastic plating barrels, exhibited for the first time, were used in a plating exhibit operated by Belke for the Chicago Electro Platers Institute in the promotion of plated metal finishing.

Materials Handling System

Albert Wesling & Sons, Inc., Dept. MF, 2912 West Lake St., Chicago 12, Ill.

The system is based on a master hardwood unit with inside working dimensions 24″ long by 13½″ wide by 2⅜″ deep. The bottom is made up of ½″ hardwood dowels running widthwise on 1½″ centers. This affords sufficient support for metal parts being loaded and plenty of opening for free draining of liquids or passage of air. Slots in the ends and sides of the unit permit thousands of space combinations to be set up by using crosswise and lengthwise hardwood dowel dividers. The dividers protect the metal parts (being handled) from each other and reduce part damage and loss from chipping or denting.

Build-up sections which may be added to the Master Unit for parts that are too tall to handle, are the same size and construction as the Master Unit except that they have no dowel bottom. However, cross doweling for space combinations can be set up to match the Master Unit.

Steel corner construction which extends slightly above the top edge of each unit serves to add rigidity to the units, protects the corners from scuffing and tearing, and is a safety guide when stacking the units.

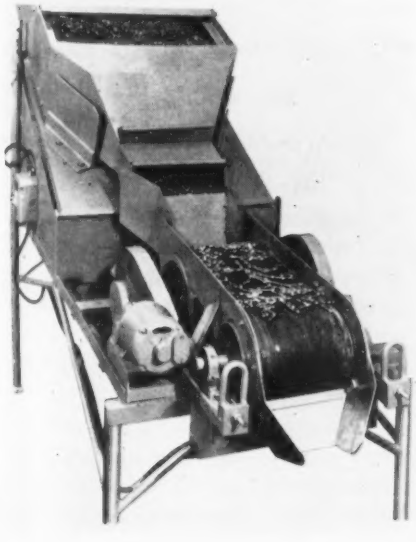
It is claimed the boxes are never obsoleted because of changes in the size of parts being produced because each unit can be rearranged and adapted to the new parts in a matter of minutes.

A peg tray which lies on the dowelled bottom of the Master Unite can be used for small parts such as bushings or gears. The peg tray is made of $\frac{3}{16}$" tempered board with 880 $\frac{3}{16}$" holes on 9/16" centers. Pegs are made of hardwood and project one inch above base of the tray.

Combination Separator

Roto-Finish Company, Dept. MF, 3700 Milham Rd., Kalamazoo, Mich.

The Roto-Finish MMG 34-12, a combination mechanical magnetic separator, is especially designed to separate parts from abrasive chips where both ferrous and non-ferrous parts are processed using Roto-Finish methods. The unique feature of the separator is that the magnetic and mechanical separating mechanisms are interchangeable on the portable frame. As a result, the MMG 34-12 can be used



either as a mechanical or magnetic separator.

Operation of the separator is simple and efficient. A hoist pan containing the mixed parts and processing media is placed on the incline loading support of the separator. When used for mechanical separations the mixed mass passes over a motor driven, agitated separator screen. Separation is made as the oversize parts are discharged from the top of the screen, while processing chips go through the screen and discharge into a hoist pan below. The amount of agitation is controlled by a variable stroke adjustment. Screens are available in mesh sizes of $\frac{1}{16}$" to $1\frac{1}{2}$" and correspond to Roto-Finish chip sizes. Screen size is 34" x 27".

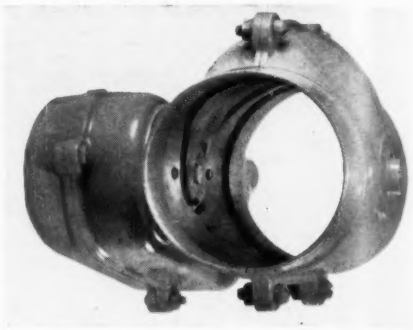
For magnetic separations the magnetic separating unit replaces the agitated screen unit. Parts and chips pass over a magnetic pulley. Parts are separated magnetically and then conveyed to a container, while the chips fall into a hoist pan below. The separator is driven by a $\frac{1}{3}$ H.P. 220/440, 3 phase motor. Floor space required is 40" x 95" x 70". For complete information write to the above address.

Air Control Valve

Kindt-Collins Co., Dept. MF, 12653 Elmwood Ave., Cleveland 11, O.

Announcement of a new automatic air-control valve, for use with air suction systems and dust collectors on units such as metal grinding and polishing machines, and other similar equipment, is made by this company.

Several exclusive and unusual features are claimed by the manufacturer for this new product to be known as the Ventomatic Air Control Valve (patent applied for). Extremely simple



in design, this unit can be fitted to any machine, pipe or installation within its scope. The valve opens and closes automatically as the machine switch is turned on and off. This prevents the continual exhausting of warm air from the room when the machine is not operating, and effects important heating economies.

Improvement of efficiency in the entire suction system results from concentrating suction only on those machines that are actually operating. When the valve is open there is absolutely no obstruction in the air passage, eliminating the possibility of catching chips, dust, lint or shaving threads. The operation of the valve is mechanically controlled by a solenoid, and is no way affected by the air stream. The new valve has been thoroughly tested and proved in actual performance tests over long periods of time.

Sizes are available to fit 3", 4", 5", 7" and 8" ducts. Dealer and jobber inquiries are invited. Complete details and prices can be secured from the above address.

New Hydrotector

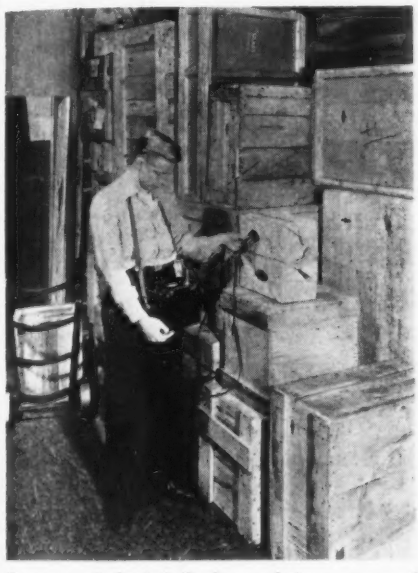
American Instrument Co., Inc., Dept. MF, Silver Spring, Md.

The effectiveness of sealed packages in preventing corrosion damage to their contents can now be measured quickly, easily and inexpensively by this new Hydrotector.

This is an electronic instrument which "sees inside" sealed packages and measures the degree of moisture to an accuracy of plus or minus $2\frac{1}{2}\%$. Measurement is accomplished by a small sensing element permanently in-

stalled inside the package. This element is connected electrically through a mounting to the exterior of the package. The portable meter makes contact with the mounting for reading. No special training is required for the meter operator because the instrument is gauged to read safe or unsafe, depending upon inside conditions of the package. An individual package may be checked in less than two seconds.

The Hydrotector can be installed in packages already sealed without doing harm to the moisture barrier or may be installed in packages being prepared for storage. It is the one new development in packaging which allows constant, accurate checks without destroying packages in order to check their contents.



Contents of Sealed Packages being measured quickly and easily by the new Hydrotector.

BUSINESS ITEMS

Hanson-Van Winkle-Munning Appoints Thomas J. Menzel as Plating Chemist

The *Hanson-Van Winkle-Munning Co.*, Matawan, N. J., announces the appointment of *Thomas J. Menzel* to the position of Plating Chemist. In his new position he will be responsible for all experimental and process plating in H-VW-M's new plating laboratory. For the past several years he has been in charge of analytical work and customer's service work.

Menzel has a B.S. degree from Hudson College of St. Peters College, Jersey City, and has completed special courses at New York University. His work in the electrochemical field began when he joined the Hanson-Van Winkle-Munning Company in 1943 as a chemist, later becoming analytical chemist. From this post he now advances to his new assignment.

Thomas J. Menzel

Beckman Instruments Appoints Architect for New Plant

Dr. A. O. Beckman, President of *Beckman Instruments, Inc.*, South Pasadena, Calif., has announced that the engineering and architectural firm of *Donald R. Warren Co.*, Los Angeles, has been retained to design the new main plant and offices which will be erected for the company in the La Habra-Fullerton area. Plans call for an expandable design with an initial floor space of 200,000 square feet.

New Buffing Machine Co. Formed

John F. Harper has announced the formation of the *Harper Buffing Machine Co.*, 252 Main St., Portland, Conn. The firm will specialize in manufacturing automatic buffing machines.

M. E. Baker Co. Distributor for S. C. Johnson

Mr. L. J. Love of *M. E. Baker Co.*, 25 Wheeler St., Cambridge 38, Mass., has announced that this company is now handling Johnson's Corrosion Inhibiting Metal Finishes. Further details may be obtained by writing Mr. Love at the above address.

Lea Acquires Gripmaster

The *Lea Manufacturing Co.* announces the formation of a wholly owned subsidiary known as *Lea Mfg. Co. of Michigan, Inc.*, formed for the express purpose of manufacturing and marketing Gripmaster polishing wheel cement. Lea Mfg. Co. of Michigan, Inc., has purchased the patent rights, trademark rights and goodwill of Gripmaster from the *Nelson Chemicals Co.*, Detroit, Mich., as of July 21, 1952.

For the time being Lea will manufacture and sell Gripmaster on the premises of Nelson Chemicals Co., 12345 Schaefer Highway, Detroit, Mich., observing the same high standards of manufacture and control which have been practiced in the past. A new plant in Detroit is under construction which will house Lea and Gripmaster.

Temporarily, all communications and orders should be sent to Lea Mfg. Co., of Michigan, Inc., P.O. Box 3943—Strathmoor Station, Detroit 27, Mich. Phone—WEbster 3-5558.

For information please contact this number or the resident Detroit Manager: *Dee F. Mosher*, 550 South Glenhurst, Birmingham, Mich. Phone—MIdwest 4-9051.

Charles I. DeBisschop will be at the plant to take care of customers.

Udylite Acquires L. H. Butcher

It was announced recently that the *Udylite Corp.* has acquired the *L. H. Butcher Co.*, with sales offices and distribution outlets on the West Coast.

Among the products added to its line are industrial chemicals, ceramic supplies and insecticides, and the Udylite Corp. will now expand their coverage of the western states.

For more than 25 years Udylite has pioneered in plating techniques, equipment and processes, and by the addition of Butcher's facilities it will cover the electroplating industry on a nationwide basis.

Industrial Lining Engineers Changes Name

Industrial Lining Engineers, Inc. of 3527 Smallman St., Pittsburgh 1, Pa. has announced a change in name to *Chase Chemical Corp.* This is a change in name only. Plant locations, activities, personnel, policies, as well as ownership, will remain the same as in the past.

Pesco Office Now in Brooklyn

Pesco Plating Equipment Corp. has announced the removal of its office to 75 Wythe Avenue, Brooklyn 11, N. Y. Counter service is also available at this location. This move is for the business office only, as the firm is still maintaining its store and showroom at 182 Grand Street, New York 13, N. Y.

Chase Brass & Copper Co. Announces Employee Training Program

The *Chase Brass & Copper Co.*, a subsidiary of *Kennecott Copper Corp.*, has announced an employee training program designed to assist employees in the development of greater abilities, skill and know-how.

Walter L. Smith, works manager has appointed *Eraldus Scala* as Chase Metal Works training director.

Mr. Scala has been a member of

the Chase Research Department where he has specialized in development work in the casting shop and in alloy research.

After obtaining his B.S. in chemistry from the College of the City of New York and his master's degree in metallurgy from Columbia University, Mr. Scala began his career as a chemist with *Ledoux & Co.* in New York. He joined the metallurgical staff of the Chase Metal Works in 1948 and is studying at Yale for his doctorate in engineering.

W. D. Forbes in New Quarters

W. D. Forbes Co. has announced that it is now located in new quarters at 129 - 6 Ave., S.E., Minneapolis 14, Minn.

Du-Lite Moves to Larger Quarters

The *Du-Lite Chemical Corporation* has completed the transfer of all operations to its new plant on River Road, Middletown, Conn.

According to *Kenneth J. Dooley*, President, the move was necessitated by the increasing demand for metal finishing and blackening chemicals and enlarged production on several new Du-Lite products.

The new quarters include 8,500 sq. ft. of production area, ample laboratory and quality control space, and modern offices.

The move was completed without interruption in deliveries, which have already been increased by the new facilities.

Archer - Daniels - Midland Opens Sales Office

Archer - Daniels - Midland Company opened a sales office at San Francisco July 1. The office, located at 1495 Custer Ave., is managed by *W. A. Baker*, formerly sales manager of *A. J. Lynch and Co.*, San Francisco.

The San Francisco office handles the complete line of A.D.M. products which include the following: linseed oils, soybean oils, fatty acids, chemically modified oils, fish and other marine and vegetable oils plus various products manufactured by it Los Angeles plant.

The new office serves the northern part of California. It handles distribution of all of the firm's products formerly handled by *B. E. Dougherty* and *A. J. Lynch* and *Company*.

Baker is a native of Oakland, Cal., and is a graduate of Stanford University and has been active in the vegetable and marine oil business since 1946. He resides at 2919 23rd Ave., San Francisco, and is a member of the Meadow Club, and the San Francisco Radio Club.

DuPont Celebrates 150th Anniversary

The 150th anniversary of the *Du Pont Company* was observed July 18 in ceremonies at the site of the company's first mill on Brandywine Creek.

An audience of nearly 7,000 people, mostly active and retired Du Pont employees and members of the du Pont family, attended. Employees were selected to represent each of Du Pont's 71 plants and many of its laboratories and sales offices. They came from 25 states, some as distant as the West Coast. In addition, thousands of men and women at the company's plants, laboratories, and sales offices across the nation held their own celebrations and heard the program, which was broadcast over the NBC radio network from 3 to 4 p.m. (E.D.T.)

The program in Wilmington included an historical dramatic prologue depicting the company's founding. After the prologue, *Henry B. du Pont*, great-great-grandson of the founder, and a vice-president and member of the Du Pont executive committee, spoke, followed by *Crawford H. Greenewalt*, president, and *Walter S. Carpenter, Jr.*, chairman of the board of directors.

Jack Beall

and ventilation work required in connection with metal finishing facilities.

Principals of the new company include: *Jack Beall*, President; *Tom Turner*, Vice-President-Treasurer; and *Hal Wells*, Vice-President-Secretary. Beall, a registered chemical engineer, was graduated from Penn. State, served *Harshaw Chemical* for nine years, and has been manager of the *Metal Finishing Division* of *A. J. Lynch & Company* for the past six years. Turner received his formal training at U.C.L.A. and has been, for fifteen years, with A. J. Lynch & Co., where he was secretary and manager of the Chemical Division. Wells is a chemical engineer from the University of Denver. He was with Lockheed Service in charge of processes, and sales engineer at A. J. Lynch & Company prior to joining Crown Chemical. Main office and plant are in Los Angeles. San Francisco and the North-

Tom Turner

Minneapolis-Honeywell Appointments

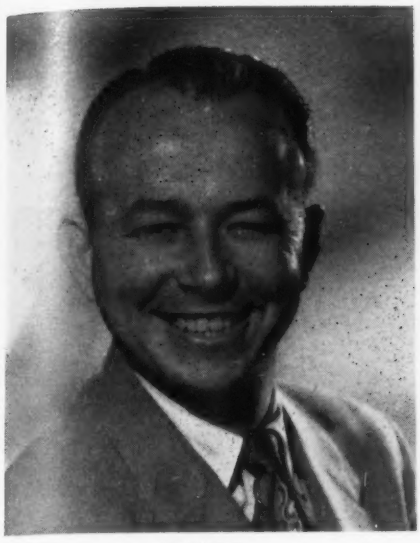
Seven regional industrial sales managers have been named by *Minneapolis-Honeywell Regulator Co.* The regional post is new and is part of a move to give industrial field men more responsibility, the company announced.

Those appointed and the regions in which each will have charge are: *Jack E. MacConville*, the Southeast with headquarters in Atlanta; *Alfred J. McCullough*, the Central region with headquarters in Cleveland; *Howard L. Marston*, the Northwest with headquarters in Minneapolis; *Robert L. Mallory*, the Southwest with headquarters in Dallas; *Robert B. Grant*, the Pacific and Mountain region with headquarters in Los Angeles, and *Lester W. Williams*, the Pacific Northwest with headquarters in Portland.

The appointment of *John A. Robinson* for the Eastern and Mid-Atlantic regions was announced recently.

Crown Chemical and Engineering Company Formed in Los Angeles

This new company, located at 5649 Alhambra Ave., Los Angeles 32, offers a complete line of chemicals, metal finishing equipment and supplies, and engineering services. A specialty is the design and installation of complete metal finishing facilities on a Turn-Key basis. Crown contracts to design, furnish equipment and chemicals, and do all installation, plumbing, electrical,



Hal Wells

west will be served from branch at San Francisco.

Robert A. Ruleff Joins Bart-Messing Corp.

Robert A. Ruleff has been named western sales manager of *Bart-Messing Corp.*, Belleville, N. J. He will be located in Dayton, Ohio and will cover all of the midwestern states.

After graduating from the University of Pennsylvania with a B.S. degree in chemical engineering in 1942, Mr. Ruleff joined the *Westinghouse Electric Corporation* in Pittsburgh, Pa. as a chemical and process engineer responsible for plating operations and organic finishing. Since 1950 he has been a sales engineer for *George A. Stutz Manufacturing Co.* of Chicago, Ill. Mr. Ruleff is a registered professional engineer in the State of Ohio and a member of the *American Electroplaters' Society*.

Robert A. RuLeff

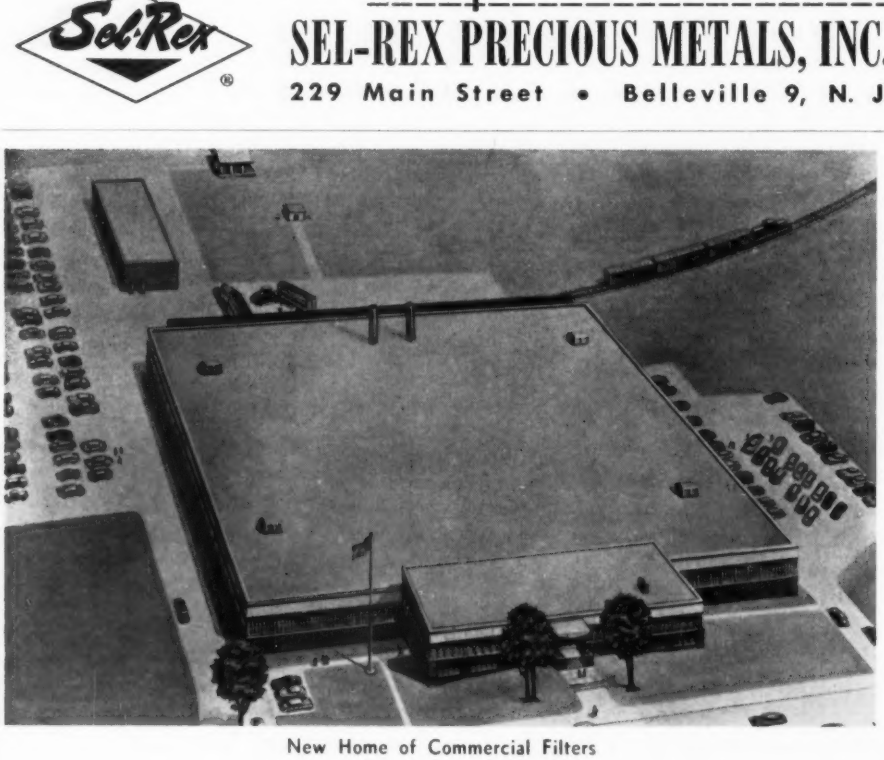
New Home for Commercial Filters

During July, Commercial Filters Corp., manufacturers of Fulflo Filters for the microscopic clarification of industrial liquids and gases, moved from Boston to its fine new factory in Melrose, Mass.

In every aspect the new plant has been carefully planned to provide every advantage afforded by the most recently developed types of construction and equipment. The plant consists of three buildings with total area of 135,000 feet. The main building provides a large garage for company cars and trucks. All buildings are of fireproof construction and fully provided with modern fire protective equipment.

Special features include: glass-block side walls; perimeter hot water heat and radiant heat floor panels in manufacturing areas; automatically controlled forced air winter heating and summer cooling and fluorescent lighting. Manufacturing areas used for processing cotton have controlled humidity. The office building will have all latest improvements.

A 250-seat cafeteria is equipped with the latest in stainless steel cooking and service equipment to provide attractive low-cost cafeteria service to employees. The service and office building also contains ample engineering offices and two well-equipped laboratories. In this new plant, affording as it does the ultimate in production facilities and attractive surroundings for its employees, Commercial Filters Cor-



New Home of Commercial Filters

poration will be well equipped to maintain and increase its position in the field of modern filter manufacture and research.

Don Booth Joins Wyandotte Chemicals

Don Booth

Don Booth, well known to the metal finishing industry in Wisconsin, has joined the Industrial Department of *Wyandotte Chemicals Corp.*, Wyandotte, Mich. He will be an industrial sales supervisor for the state of Wisconsin.

Mr. Booth is a graduate of University of Wisconsin, served 5 years in the U. S. Army and has had nine years of sales and industrial metal finishing service experience. He recently reviewed product application methods with the Wyandotte Chemicals Technical Service and Research Laboratories.

John E. Hawley Joins Pennsalt

John E. Hawley has joined the *Pennsylvania Salt Manufacturing Company's Research and Development Division* at the *Whitemarsh Research Laboratories, Wyndmoor, Pa.*, it was announced recently.

Previously on the Engineer of Tests staff of the *Baltimore and Ohio Railroad*, Mr. Hawley's new duties in the Maintenance Chemicals Department of Pennsalt will involve the development of cleaning compounds for the transportation industry.

A native of Hartford, Connecticut, he obtained both his B.S. and M.S. at the University of Connecticut. He is a member of the Society of American Bacteriologists, the American Public Health Association, the Locomotive Maintenance Officers Association, and Sigma Psi.

Dr. Carr Joins Bart Products

Dr. Dodd S. Carr is now associated with *Bart Products, Inc.* of Belleville, N. J., as assistant director of electrochemical development. He is in charge of all chemical and electrochemical

Dr. Dodd S. Carr

phases of the electroforming operations of the company and will work on the development of new plating processes and techniques. Dr. Carr received his Doctorate in Chemical Engineering from The Johns Hopkins University and was formerly connected with the *International Nickel Company Research Laboratory.*

Planet Plating Moves to New Location

Planet Plating Co., Inc., 494 Morgan Ave., Brooklyn, 22, N. Y. have recently moved into their new and larger quarters, and have considerably added to their capacity to serve their clients. The company specializes in electroforming in copper, nickel and other metals and specification silver and gold plating.

Cowles Holds Sales Meeting

This group participated in the annual sales conference of the Metal Cleaner Department of *Cowles Chemical Company*, held recently in Cleveland. Instruction and discussion sessions were held on Cowles Metal Cleaners, company sales efforts, and new product development to give the metal working industry up-to-the-minute service for better cleaning quality and economy.

In the picture, left to right, first row: C. C. Bassett, Clarence Ozar, C. W. MacMullen, Earl Clark, R. F. Huntley; second row: Gene Brost, Bob Campbell, Bob Aufderheide, Clyde Lowe, Don Weaver, Jack Dobson, Fred Hitchcock; third row: George Woleben, Gene Garman, Carl Clabaugh, Charles Churchill and Elmer Lord.

Alcoa News

Frank L. Magee, vice-president and general production manager of *Aluminum Company of America*, has been elected a director of the company by action of Alcoa's board of directors.

At the same meeting, the board announced the retirement of *J. R. D. Huston* as a secretary, a position he has held for the past eight years.

Alfred M. Hunt, a member of the board of directors, was elected to succeed Mr. Huston. Mr. Hunt has been assistant secretary since June, 1950.

Mr. Magee's elevation to the board comes after 34 years with the company. Following graduation from Lehigh University, Mr. Magee started with Alcoa as a sales apprentice in the New Kensington Works in 1917.

Mr. Huston came with Alcoa in 1918 after 13 years of law practice in Pittsburgh. He did his undergraduate work at Amherst College and obtained his law degree from University of Pittsburgh.

Mr. Hunt, a graduate of Yale University, came with Alcoa in 1942. His first position was as a technical apprentice in the Massena, N. Y., Works. Later, he worked in the New Kensington, Pa., Alcoa, Tenn., and Cleveland, Ohio, Works before returning to Pittsburgh to become a member of the board of directors in 1949.

M. W. Batchelor Appointed Riverside Metal Co. President

The Board of Directors of *The Riverside Metal Company*, manufacturers of copper base alloys announces the appointment of *M. W. Batchelor* as President of the company.

Mr. Batchelor was educated at Columbia University and Detroit University in both business administration and engineering, and has worked in the non-ferrous metal industry for more than twenty-five years. During this time he was associated with *Revere Copper & Brass Company*, was Executive Vice President of *Bridgeport Brass Company* and Manager of the Cleveland, Ohio, mill of the *Chase Brass & Copper Company*.

During World War II, Mr. Batchelor was invited by the government to join a commission as a non-ferrous representative to survey Europe.

He is a member of the *American Society for Metals*, the *American Institute of Metallurgical Engineers*, and numerous civic and business organizations.

Industrial Supplies Opens Tumbling Division

The *INSCO Tumbling Division* of *Industrial Supplies and Equipment Co.* will open at 26 Charles St., Meriden, Conn., about August fourth, it was announced recently by *Morris S. Shipley*, President. The parent company, with executive offices in Greenwich, Conn., specializes in tumbling techniques and acts as manufacturer's representative and distributor of a wide range of equipment, abrasives, compounds and other barrel finishing supplies.

Space has ben acquired in the former *Charles Parker* building, now owned by *Maisto Silver, Inc.* As soon as specially designed floors and drains have been completed, a variety of equipment will be installed, ranging from bench barrels for watch and other tiny parts, to large, high production units and to submerged barrels for production of ultra-low microinch finish or of jewelry-like luster.

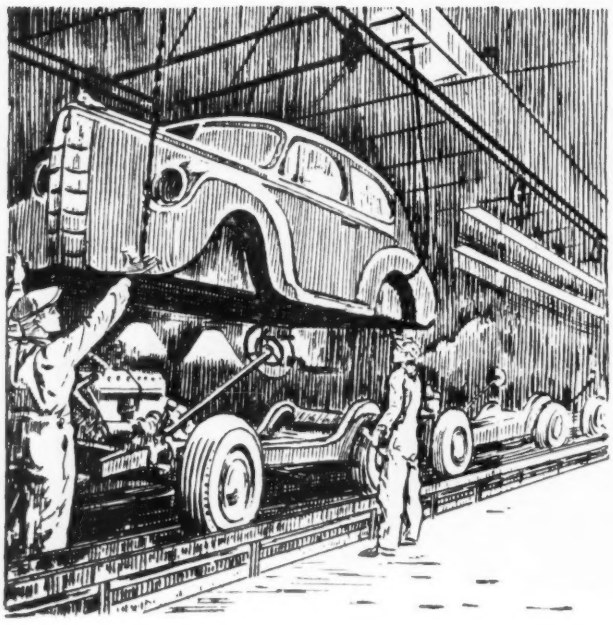
Mr. William Biebel of Fairfield, will be in charge of the Meriden plant. For the past 15 years Mr. Biebel has been with *Singer Manufacturing Co.* in Bridgeport, where he has had wide experience in all types of metal finishing. More recently he has been Divisional Engineer in charge of all polishing, buffing and tumbling operations and has, himself, developed numerous special techniques.

Westinghouse Meter Division Names Engineering Manager

S. C. Leyland, of Bloomfield, has been named manager of engineering for the *Westinghouse Meter Division*, it was announced by *James M. Wallace*, division manager.

A native of Fall River, Mass., Mr. Leyland received his degree in electrical engineering from Worcester Polytechnic Institute, Worcester, Mass., in 1924. He joined Westinghouse at East Pittsburgh, Pa., in 1925, and held various engineering posts there until his transfer to the Meter Division in 1931 as design engineer for indicating instruments. From 1941 until his new appointment, he was manager of the relay engineering section.

In his new post, Mr. Leyland will be responsible for the design of all products produced at the division, including watthour meters, relays, instruments and auxiliary equipment.



MOTOR CITY PLATING NEWS

by

Edward Finne

We made a trip to Chicago for the AES convention along with the approximately 175 other Detroit members who attended the big doings either partially or fully.

Many of the exhibits proved tremendously interesting and this poor writer's legs and feet were sore for a week, from several trips around the Amphitheater.

Especially interesting was an exhibit sponsored by, of all people, nuns of *Immaculata High School* of Chicago and operated by girl seniors. The girls have been working on their own time as a club project on anodizing and silver plating processes and displayed considerable of their handiwork—this

work was exceptionally good and their booth created quite an interest.

Joe Andrus of the Chicago branch is the technical advisor of the group and has given considerable of his time to the project. It seems that Andrus has a sister who is a nun and it was through her that he became interested in taking over.

Anyway, it was kind of nice to see our finishing business in a project of this sort. The girls do need some equipment and, as you may well know, budgets in a school have very little funds for extracurricular frills. They need a small bench-type buffing lathe, buffs and compounds. If any readers have a spare lathe and some supplies, why not send them to Immaculate High School, 636 W. Irving Park, Chicago.

****

The Plating Institute of Michigan has elected the following officers for the coming year:

President—*Robert J. Huber*, Michigan Chrome & Chemical Co.

Vice-President — *John Hilfinger*, Hilfinger Plating.

Treasurer—*Glen H. Friedt*, United Platers, Inc.

Executive Secretary — *James D. Mueller*, Plating Institute.

Directors — *Webster B. Knight*, Knight Plating; *Howard E. Morse, Jr.*, Northeastern Plating; *Paul Henning*, Detroit Plating Industries; *Henry Bock*, Auto City Plating; *William Savin*, Harding Mfg.; *Manley Young*, Art Metal Platers; *Gerald Burgess, Jr.*, Electroplating Service.

****

The *Shell Chemical Corp.* has announced the appointment of *D. F. Bradley* as manager of its Detroit district sales office. He succeeds *W. E. Keegan* who has been named assistant to the vice-president of marketing of the corporation.

A Detroiter, Bradley joined Shell Chemical in 1947. He was moved to the firm's New York office as manager of the Solvents Department of the Eastern Division and now returns to Detroit.

****

The *S.&S. Polishing Corp.*, formerly at 9165 Central, Detroit, has moved into the brand new building of the Electro Finishing Industries, Inc., at 21841 Wyoming, in Oak Park.

****

Chemical Processing, Inc., 981 Franklin St., Detroit have opened their doors for business. The firm, under the direction of *Mitchell Kefarsky*, will offer phosphatizing, Alodizing and other allied services.

****

John Hasten, formerly of *C. M. Hall Lamp Co.* of Detroit, has shifted to *Auto City Plating Co.*, 197 S. Waterman, Detroit, where he is working as assistant to *Tony Cassin*, general manager.

Jack leaves Hall Lamp after some 25 years with the firm where he was in charge of finishing at both the Detroit and Indiana plants.

****

United Platers, Inc. of 994 Madison, Detroit, are being forced to move from their present location by Detroit's slum clearance project and are, at present, moving to the old *Auto City Plating* plant at 3456 Denton, Hamtramck 11, Mich.

****

Cranston F. Jones has been elected vice-president and will operate as sales manager of the *Metals Finishing Corp.*, 836 E. Ten Mile Rd., Hazel Park, Mich., *H. V. Beggs*, president announced.

Jones is a graduate of the University

of Michigan and was formerly associated with *General Electric Co.* and *Clary Multiplier Corp.*

****

A. Betteley, formerly of *Harding Mfg. Co.* of Detroit, has taken a position as assistant to *R. Axsom*, general manager of *Michigan Chrome & Chemical Co.* of Detroit.

Al has been connected with plating for some time in Detroit and has been active in the *Plating Institute* and the *National Association of Metal Finishers*, serving in various capacities in both organizations.

Manufacturers' Literature

Mechanical Properties of Nickel Deposits

International Nickel Co., Inc., Dept. MF, 67 Wall St., New York 5, N. Y.

12 pages, with 13 charts, 3 tables and numerous photo-micrographs that show the wide range of properties that may be obtained in electro-deposited nickel by varying the solution and plating procedure. The design engineer will find data on the interrelation of ductility, strength and hardness in deposits that may be obtained in present-day rapid nickel plating solutions. The plater will find data that will help him meet the specifications of the design engineer.

This firm also has issued a booklet entitled Adhesion of Hard Nickel to High-Strength Aluminum Alloy — 5 pages, 10 tables and working drawings. Describes improved procedure of the well-known zincate process for electroplating on aluminum alloys. This procedure gives satisfactory adhesion and a wear resistant deposit of hard nickel on a high strength wrought zinc-aluminum alloy (Zn-7%, Mg-1%, Mn-0.5%).

Copies of these booklets may be obtained, free, by writing to the company at the above address.

Finishing Compounds

The Apothecaries Hall Co., Dept. MF, Waterbury, Conn.

This firm has just issued a series of six bulletins describing the latest developments from AHCO's finishing laboratories. These new finishing compounds include Stainless Steel Buffing Compound (Bulletin B-1), Greaseless Compound (Bulletin B-2), Liquid Buffing Compound (Bulletin B-3), Burnishing Compound (Bulletin B-4), Cutting Compound (Bulletin B-5), and Water Displacing Liquid (Bulletin B-6). These bulletins may be obtained by writing to the company at the above address.

Brochure on Vacuum Metallizing

F. J. Stokes Machine Co., Dept. MF, 5500 Tabor Rd., Philadelphia 20, Pa.

A new comprehensive brochure entitled "Vacuum Metallizing Today," has just been published by this firm. It describes in detail this newest low-cost coating process and how it can be applied to the surfaces of plastics, metals, glass, paper, textiles, leathers, and many other products.

The basic principles of vacuum metallizing are outlined and schematically illustrated in the new 12-page brochure. The complete vacuum metallizing process is thoroughly covered, including pre-treatment, drawing of vacuum, metallizing and finishing. Recent developments leading to the acceptance of vacuum metallizing as a practical coating process for a broad number of new products are discussed.

Costs of vacuum metallizing are compared with other forms of plating. The various kinds of coatings now available for vacuum metallizing purposes are described. Stokes vacuum metallizing units are also pictured, accompanied by specifications and mechanical descriptions of their design and construction.

Copies of "Vacuum Metallizing Today"—Catalog No. 725—and a test run of any products which manufacturers desire to metallize, may be had through contact with the manufacturer at the above address.

Spray Nozzles

Binks Manufacturing Co., Dept. MF, 3122 Carroll Ave., Chicago 12, Ill.

Anyone responsible for the specification of spray nozzles for metal cleaning, Bonderizing, spray quenching, gas washing, or similar industrial applications will find a wealth of information in a new 40-page Industrial Nozzle Bulletin just published by the above manufacturer.

This bulletin fully describes industrial spray nozzles for a broad range of commercial and industrial processes. Data given include nozzles dimensions, capacities and spray angles. All nozzles are illustrated and in many cases cut-away drawings showing the construction and operation of the nozzle are included. "Blue print" drawings show proper installation details where this information is required. In short, this bulletin includes everything a buyer or designer needs to select the correct nozzle for a specific application or process.

Bulletin 5200 has a unique and very handy index that lists 29 different applications for industrial spray nozzles with page references for each. By using this index full information on nozzles for any specific process can be quickly and easily found.

Copies of Binks Industrial Nozzle Bulletin No. 5200 will be mailed free to all readers of this magazine who request it on their company letterheads.

Corrosion-Proof Cements

Atlas Mineral Products Co., Dept. MF, 61 Walnut St., Mertztown, Pa.

A new bulletin No. 5-2, providing technical data and catalog information on the four basic types of corrosion-proof cements, has just been released by this company.

Included in the new bulletin are graphic charts showing the temperature range of each cement and its resistance to broad classes of corrosives. Resistance tables rate each cement specifically for 176 common chemical materials. In addition, the three principal acid-proof brick and cement constructions are also shown in association with estimating tables for each construction.

Electrical Equipment Catalog

Electric Equipment Co., Dept. MF, 63 Curlew St., Rochester 1, N. Y.

The above company now has in preparation a 36-page catalog showing the "World's Largest Inventory" of motors, generators and transformers in stock for immediate shipment. They suggest that readers write for free copies.

Continuous Blast Cleaning

American Wheelabrator & Equipment Corp., Dept. MF, 1150 S. Byrkit St., Mishawaka, Ind.

"Continuous Airless Blast Cleaning" is the subject of a new bulletin just published by the above firm.

Of particular interest to shops hav-

ing the problem of cleaning relatively large tonnages on a production basis, the bulletin explains the process of continuous blasting and illustrates how it is being applied in actual practice.

Free copies of this literature are available on request. Ask for Bulletin No. 844.

Flow Rate Control

W. A. Kates Co., Dept. MF, 430 Waukegan Rd., Deerfield, Ill.

A new bulletin, just published by the W. A. Kates Co., Deerfield, Ill., describes in detail the company's line of flow rate regulators.

The principle of operation employed by all Kates Regulators is clearly illustrated in the bulletin, which also shows why the simplicity of this principle permits troublefree accuracy and flexibility in service. In addition, the literature explains why Kates Regulators, which are unaffected by pressure fluctuations, are superior in performance and economy to more elaborate systems, and describes a few of the many applications which have successfully utilized these regulators at great savings in installation and maintenance costs.

Manual on Industrial Magnifiers

Bausch & Lomb Optical Co., Dept. MF, 558 Bausch St., Rochester 2, N. Y.

A 24-page authoritative guide, titled "Industrial Magnifiers — How to choose and use them," has been published by the Bausch & Lomb Optical Co. Believed to be the only book of its kind available, it is offered free of charge to magnifier users.

The nine by six-inch book outlines the optical principles of magnifiers in easily understandable language, describes the basic types, tells how to use and care for them, and includes a magnifier selector chart and glossary. It is illustrated with more than 50 photographs and diagrams. Specifications of 75 magnifiers made by Bausch & Lomb for a wide variety of industrial and professional uses are given in detail in a magnifier selector index.

Solenoid Valves

Barksdale Valves, Dept. MF, 1566 East Slauson Ave., Los Angeles 11, Calif.

The complete new line of "Shear-Seal" Solenoid Valves—Shut-off, 2-Way Diverter, 3-Way Selector, and 4-Way Selector—is covered in the Barksdale Catalog 1B-2 along with illustration and description of the "Shear-Seal" principle. Valves for air, water, and oil service come in three groups of pressure ranges—0 to 250 p.s.i., 0 to 1500 p.s.i., and 0 to 3000 p.s.i.

Six-Page Catalog Describing All Types of "Skin-Cote"

The Boyer-Campbell Co., Dept. MF, 6540 St. Antoine St., Detroit 2, Mich.

"The Answer to Industrial Dermatitis is just as simple as this" is the title of the new six-page catalog and price list on "Skin-Cote" recently released by this firm.

Many large manufacturers have discovered that there is a type of "Skin-Cote" for every industrial use. In plants where this product has been adopted as standard equipment, industrial dematitis, it is claimed, has been almost completely eliminated. Catalog contains comprehensive chart of chemicals and processes and the type of "Skin-Cote" recommended for each.

Acid-Proof Materials and Construction

Aqua-Therm, Inc., Dept. MF, 39-63 N. Torrence St., Dayton 1, O.

Three descriptive and technical bulletins on the subject are offered by this firm. Bulletin No. 139 discusses Eonite pipe and fittings, made of furan resin material reinforced with laminations of chemical glass fabric cloth, for handling most mineral acids, alkalis, and organic solvents. Bulletin No. 160 discusses the acid-proof construction of pickling and plating tanks; process tanks, vessels, and towers; pickling and plating basins; acid-proof floors. Structural work may be steel or concrete. Covering materials are Pyroflex Lining, acid-proof cement. Bulletin No. 190 discusses Eonite lacquer, a coating to protect interior or exterior surfaces from the corrosive effects of gases, vapors, mists, and liquids. This lacquer is furnished with black, gray, or metallic pigment. Installations are made by the company's field men or by customers' labor under Aqua-Therm supervision. Copies of any or all of the bulletins will be sent upon request.

Corrosion Resistant Equipment

Agile Corporation, Dept. MF, Maple Heights, O.

Just published is a 12-page catalog describing the complete line of corrosion-resistant plastic pipe, tubing, ducting, and fittings manufactured by this firm. Copies are available on request.

Nickel Plating with Insoluble Anodes

International Nickel Co., Dept. MF, New York 5, N. Y.

Describes advantages and limitations of using a chloride-free electrolyte at high current density for industrial electrodeposition and electroforming of complicated shapes. Presents a new way of concurrent replenishment of the electrolyte using commercially pure nickel. 12 tables and illustrations indicate economic power consumption (0.78 KWH per lb. of nickel dissolved); optimum pH, current densities and rate of electrolyte circulation. Explains how to design a regenerating unit. Gives the mechanical properties that can be expected (similar to Watts-type nickel). Nickel plating with insoluble anodes, is not suitable for bright-nickel process. Advantages are that it permits permanent anode shapes, elimination of anode bags, reduction of anode scrap losses, elimination of addition agents to prevent pitting, use of high anode and cathode current densities. Obtainable from the above company.

Belt Conveyor

The Rapids-Standard Company, Inc., Dept. MF, 342 Rapistan Bldg., Grand Rapids 2, Mich.

A four-page illustrated bulletin describing the new Press-Veyer, Jr. cleated belt conveyor has just been published by the above firm. Included are drawings, photos, and specifications of a wide range of models designed for handling metal stampings, screw machine products, scrap, and similar materials in press rooms, forge shops, and general manufacturing industries.

The bulletin points out how the Press-Veyor, Jr. can be used both for moving goods from a machine into a parts container or from machine to

machine in progressive operations. Construction features that provide light weight for portability while insuring long service under rugged plant conditions also are covered in the bulletin. Specifications are in easy-to-read chart form, with each part of the unit labeled on an outline drawing for easy identification.

Selenium Rectifiers

Wesley Block & Co., Dept. MF, 39-15 Main St., Flushing, N. Y.

This firm has recently published new catalog sheets on Richardson-Allen Selenium Rectifiers. Any reader desiring to bring his catalog up to date may obtain these new sheets by writing to the company at the above address.

Bulletin on pH Theory and Practice

The Foxboro Co., Dept. MF, Foxboro, Mass.

A review of pH theory and its practical applications in industrial measurement and control are contained in Bulletin 430-1, issued by the above company. Featuring a step-by-step explanation of the units employed in the pH control cycle, the 6-page bulletin is profusely illustrated to show instrument details, typical process applications and accessory equipment. Copies will be sent on request.

Electric Control Thermometers

Minneapolis - Honeywell Regulator Co., Brown Instruments Div., Dept. MF, Wayne and Windrim Aves., Philadelphia 44, Pa.

Catalog 6482 describes recording and indicating circular case electric control industrial thermometers used for temperature control on drying ovens, cooking kettles, lumber kilns and plating tanks. Information on available switching action, chart and scale ranges, dimensions and bulb and tubing variations is included.

Cost Chart for Polishing and Buffing

E. Reed Burns Mfg. Corp., Dept. MF, 40 Withers St., Brooklyn 11, N. Y.

The above firm founded 64 years ago, makers of polishing and buffing compounds and of the Green Thread Buffs, announce a Cost Analysis Check Chart for accurately computing the cost of polishing and buffing operations.

The company claims that the Check Chart facilitates making tests to determine the most efficient and economical compounds for each particular operation. Neatly laid out for this purpose, it is simply a matter of filling in the figures indicated on the card. When the test is completed and all the figures are in, the actual "net" cost of the buffing or polishing operation is readily computed.

To test-compare the cost of this company's compounds with those of other manufacturers, samples may be had upon request. In testing various compounds, it is necessary to subject them to the same identical operating conditions. Thus, if the spindle speeds or the wheel diameters vary, a true test cannot be made since these two factors play an important part in the performance of a compound.

For copies of the Cost Analysis Check Chart and samples, write to the company directly. When writing for samples please specify 1. material worked, 2. diameter and spindle speed

and type of wheel, 3. Finish desired. Address all inquiries to Mr. Lloyd S. Burns. Vice-President of the above company.

LETTER TO THE EDITOR

METAL FINISHING
581 Broadway
Westwood, N. J.

Attention: Nataniel Hall, Tech. Ed.

Dear Sirs:

Thanking you for your letter of June 25, 1952. We have found your information very helpful in solving our problem.

We would also take this opportunity to compliment you and the staff of METAL FINISHING for the fine job they are doing in the field. We find your publications are of more help than the other subscriptions we have regarding this phase of work.

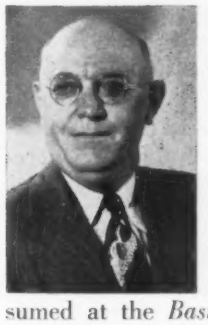
Thanking you again and will look to you for any future solving of our problems.

Very truly yours.

L. F. ZAGUNIS

News from California

By Fred A. Herr



California manufacturing and plating interests, who will ultimately be the largest purchasers of the material, were gratified recently to learn that production of magnesium has been resumed at the *Basic Magnesium* plant at Henderson, Nev., for the first time since 1944. *Titanium Metals Corp.* at present is reported to be producing the light metal in Unit 7 of the plant as a by-product of titanium.

Basic Magnesium was constructed by the government during World War II and became the world's largest producer of magnesium while the military demands persisted. It was reactivated four years ago when the State of Nevada purchased it for $24,000,000 and resold to various concerns. Construction of several new units was completed in 1951 at a cost of six million dollars and others now under construction will cost an estimated 30 million dollars.

Corporations now operating in the former Basic Magnesium layout include *Combined Metals Reduction, Stauffer Chemical Co., Titanium Metals Corp., National Lead Co., Manganese, Inc., Western Electro-Chemical Co.,* and *United States Lime Products.* In June, production of magnesium had reached 90 carloads per month. The near future was expected to see the production of lead, manganese, zinc and other metals from ores mined in the Pioche and adjacent Nevada districts.

In a manner of speaking, *Myron H. Orbaugh* of the *Bone Engineering Company*, Glendale, is celebrating a "wooden"" anniversary this summer, although his work for Bone Engineering concerns practically anything except wood. Myron is rounding out his fifth year as supervisor of electroforming for the company.

Myron graduated with a BS degree

in Chemical Engineering from Purdue University in 1935. After graduation he joined *United Chromium, Inc.* as analytical chemist, later transferring to field engineering. In 1937 he was put in charge of a research and development program in electroforming for the *United States Rubber Company* and, during the following four years, directed the development of new uses for iron and nickel electroforming—with subsequent elevation to production manager of U. S. Rubber's electroforming department. He served with U. S. Rubber until he moved to Southern California in 1947. Myron has held various posts of distinction and honor in the chemical and electrochemical fields, the most recent being his election as president of Los Angeles Branch of the American Electroplaters' Society.

Martin Coffler, advertising director of the *L. H. Butcher Company*, Los Angeles, has won the appreciation of the members of the *Metal Finishing Association of Southern California* by designing the organization's new letterhead and official emblem. Mr. Coffler, an accomplished artist and advertising man, produced a splendidly conceived emblem of which the MFASC can be proud.

Plans for an addition to its plant at 2313 East 51st Street, Los Angeles, have been disclosed by *J. M. Davis* of *Union Die Casting Co., Ltd.* Enlargement of plant facilities was required to expedite output of plumbing goods and aluminum and zinc die castings, it was announced.

Carroll McLaren, owner of *Santa Ana Plating Co.*, Santa Ana, Calif., and *Mrs. McLaren*, motored to Los Angeles on June 4 to enable Carroll to attend the meeting of the Los Angeles Branch of the American Electroplaters' Society. Their conveyance was a new Rocket 88 Oldsmobile which Carroll had just presented to Altha, his wife, as a birthday present. The McLarens and *Mr. and Mrs. John Merigold*, long-time friends, enjoyed a pleasant get-together preceding the opening of the platers' meeting.

McLaren reported the installation of three new tanks for zinc work in his Santa Ana plant, which is the only job shop in the city. His new equipment includes three new 400 gallon tanks—one solution, one rinse and one bright dip. The bulk of his work is on auto parts for garages.

At a meeting of the board of directors of the *Metal Finishing Association of Southern California* held recently at Los Angeles, President *Walter Behlendorf* of the *Spence Electroplating Company* named the following chairmen to head key committees during the 1952-53 year.

New Membership: *Howard Woodward*, California Rack Company, South Gate; Program: *Stanley Waslauk*, General Electro-Chrome Plating Co., Los Angeles; Credit List: *Harold Coombs, Jr.*, Crown City Plating Co., Pasadena; Membership Directory: *Ernest Fest*, Tool & Jig Plating Co., Los Angeles, and *Meyer Roter*, Artcraft Plating Co., Burbank; National Representative, *E. T. Brown*, Cadmium & Nickel Plating Co., Los Angeles; City, County and State Regulations, *Paul Kockritz*, Los Angeles Parkerizing Co.; Specifications, Messrs Brown, Coombs and Fest.

Southwest Plating Company, operated at 1347 West Slauson Ave., Los Angeles, by *Gus Brigantino*, on June 1 opened the *Brigantino Laboratories* at 1200 West Slauson Ave., which is equipped for periodic reverse plating of gold, silver and rhodium for the atomic and guided missile program. The new laboratory represents an investment of $25,000 for building and equipment, Mr. Brigantino reports. His Southwest Plating Co. operates as a general job shop, and at present is engaged exclusively in finishing aircraft parts.

R. N. Rickey, sales manager for *United Lead Construction Corp.*, Los Angeles was recalled in June for two weeks of radar training in the Air Force School at Berkeley, Calif. Rickey saw four years of service in the Air Force in the European theater during World War II. He enlisted as a private and rose to a captaincy, serving in North Africa, France, Germany and England.

Avalon Plating Company, established as a job shop about a year ago at 816 South Date St., Alhambra, Cal. by *Hal Wannamaker*, is now reported to be the only shop on the Pacific Coast specializing in the plating of wing and signal lights and other lighting fixtures for airplanes. Cadmium and zinc are the finishes used on such parts. The Avalon shop is equipped with a 300 gallon tank each for cadmium and zinc.

Mel Manell production manager of the *Olds Band Instrument Co.*, Los Angeles, joined the exclusive Hole-In-One golfing fraternity recently. Mel accomplished the feat on what is generally regarded as the "toughest" hole on the Rancho Municipal Golf Course in Los Angeles—the par 3, 198 yard No. 12—and using a spoon rather than a driver. The one-stroker enabled him to turn in a card of 76, which was sufficient to beat his friendly competitor, *Jack Dunn* of the *E. B. Dunn Company*, manufacturers representatives for buffing and polishing equipment. Mel's rewards included a trophy, with the magic ball mounted on top, from the *Titleist Golf Ball Co.*; and a Hole-In-One emblem from the Professional Golfers Association.

What is believed to be the most modern metal finishing facility in the Southwest was recently installed in the Tucson, Ariz., plant of the *Hughes Aircraft Co.* by *Crown Chemical & Engineering Co.* of Los Angeles. *Jack Beall* of the Crown organization reports that the installation includes 44 tanks of varying dimensions for all types of plating and anodizing, and a complete steam plant, demineralizer and other complementing units. All equipment was installed by Crown, with the job installed on the company's turn-key principal—complete to the point where only the starting switch has to be turned to get going.

William A. "Bill" Vensel, president of the *Vensel Company*, Los Angeles manufacturers of flow coating machines, has announced the association of *Glenn Miller* with the firm in a consulting capacity in engineering and designing furnaces, baking ovens, heating and ventilating systems. Miller was active for years in the gas combustion

field as an engineer for the *Industrial Gas Company* and plant manager for the *Aerojet Company*.

Two hundred leading chemists from various sections of the United States, Canada, Scotland and South Africa attended the 26th annual Colloid Symposium at the University of Southern California, Los Angeles, June 16 to 18. Thirty two research papers were presented. *Dr. W. C. Milligan* of *Rice Institute*, Houston, Tex., served as chairman of the symposium committee and presided over the sessions.

Program participants were present from: Marischal College, Aberdeen, Scotland; South African Council for Scientific Researches Pretoria, S. A.; National Research Council, Ottawa, Canada; National Lead Company, Shell Development Co., U. S. Bureau of Mines, Western Regional Research Laboratory, and the Universities of Utah, Northwestern, Princeton, California, Michigan State, Southern California, Duke and Pomona College.

Olds Band Instrument Co., Los Angeles, had a broad-scale expansion program so far completed in mid-June that retooling was underway and production was expected to begin some time in July on a line of Sousa-phones and other bass horns. *Mel Manell*, production manager, reports that new equipment installed included molds, dies, mandrels, metal forming and bending equipment and additional rectifier facilities. The expansion program involved purchase and remodeling of an adjacent building which added 10,000 square feet to the firm's production area.

The Olds Company operates a large plating department. The division is equipped with tanks for copper, nickel, chromium, silver and gold solutions, and auxiliary facilities for lacquering and polishing. Olds policy calls for a nickel-silver deposit on the base metal of the horns. Some parts of the instruments are silver and gold-plated, such as mouthpieces and keys.

A fire believed to have been caused by spontaneous combustion gutted the plant of *Raytec Industrial Finishes* at 5025 East Slauson Avenue, Los Angeles in June, with an estimated loss of $30,000. The blaze was fed by drums and vats of paints and varnishes, which exploded as the fire reached them.

A two months session of the *DeVilbiss Company's* school of spray painting opened at the University of Santa Clara, Santa Clara, Calif., on July 1. This is reported to be the first time in the 26 year history of the school that sessions have not been held in Toledo, Ohio. The classes are being conducted at the university with *George I. Stoddard* as instructor, and are being augmented with actual shop practice at the Santa Clara plant of the DeVilbiss Company. Enrollment is free.

Elliot C. Bacon has been appointed assistant manager of the research products division of *Solar Aircraft Company*, San Diego, Cal. The division, which is headed by *Philip M. Klauber*, directs production and sales of Solaramic coatings for high temperature metal use, stainless steel castings, and Solar back-up flux for fusion welding of metals.

Hubert A. Desmarais, formerly Pacific Coast sales manager for *General*

Dyestuff Corp., with headquarters in San Francisco, has been named general sales manager of *Pennsylvania Salt Manufacturing Co.* of Washington, with headquarters in Tacoma, Wash.

Associations and Societies

AMERICAN ELECTROPLATERS' SOCIETY

Los Angeles Branch

In a game that probably caused *Abner Doubleday*, the father of baseball, to turn in his grave like a burnishing ball in a tumbling barrel, a team of plating shop owners and employees defeated a Supply House aggregation by the close score of 22 to 21 at the annual picnic of Los Angeles Branch of the *American Electroplaters Society* on Sunday, June 29.

Scene of the carnage was Municipal Park in South Gate, Calif. Where *Gus Brigantino* of the *Southwest Plating Company*, manager of the Platers, pitted his strategy against *Larry O'Neil* of the *L'Hommedieu Company*, field leader of the Suppliers.

O'Neil chose a battery composed of himself as catcher and right-handed *George Hetz* of the *Mefford Chemical Company*, as pitcher, the apparent strategy being that *George's* cyclonic fireball would corrode the spirit of the Platers in no time at all.

For about 2½ minutes this strategy looked very good when *John Millhorn*, (Mefford Chemical Company's plating division supervisor) made an acrobatic catch of a pop foul behind third base which had been popped by *Tony Grana*, one of Brigantino's Southwest Plating Company crew. After that, science, strategy and inside baseball vanished like a nail dropped in an acid bath. Before another out was registered, 12 runs crossed the plate and that buzzing noise heard on the sidelines was Abner Doubleday whirling desperately in his grave.

The onslaught included home runs by *Cass Tarcynsky* of the *Superchrome Engineering Company*, and a similar swat by *Bob Welsh* of Southwest Plating. Sandwiched in between were singles by Brigantino, *Ron Hoyt* of *North American Aviation*, *Hal Wannamaker* of *Avalon Plating Company* and Tony Grana (his second time at bat). Scornfully batting left-handed this time, Cass Tarcynsky drove out a three-bagger, which was followed by a 400-foot homer by Gus Brigantino, a gentleman who is built like Lou Gehrig, swishes a bat like a right-handed Babe Ruth, and smiles like Happy Chandler. For some inexplicable reason, the Supplier's sieve-like defense suddenly tightened at this point and the next two batters were thrown out.

After the statistics had been compiled, it was disclosed that the Platers had scored 12 runs, with the Suppliers still to come to bat the first time.

Undaunted, the Supply House men whittled away at the lead with batches of three and four runs at a time. The two *O'Neil's* (Larry, Sr., and Jr.), *Raymond*, *Hetz*, *Francis O'Dell* of *Surface Alloys* and *Glenn Beckwith's* son *Jimmy* (Glenn's with *Metallon Corp.*) chipped in with a miscellaneous collection of doubles, triples and

homers during the next five innings. By the time the last half of the seventh inning dawned, the score stood Platers

Shown here is one of the table groups having lunch at the Los Angeles A.E.S. picnic in South Gate Park; Left: Mrs. Jack Hanlon, Jack Hanlon, Mrs. Don Bedwell, Don Bedwell, and Mrs. John Merigold, serving husband John with potato salad across the table. In foreground, right, is Earl Coffin, former owner of Palace Plating Works. Seen in far background, scooping popcorn out of sack is Hal Wannamaker, head of Avalon Plating Co. (Pictures taken by Caroll McLaren, owner of Santa Ana Plating Co.)

22, Suppliers 16, as the sales engineers took their final turn at bat.

Gus Brigantino had replaced Tarcynsky on the mound by this time. Before Gus could get his perchloric acid speed ball working, the Suppliers had pounded five runs across the plate. This rally was sparked considerably by some new blood in the persons of *Mel Manell* of the *Olds Band Instrument Company*, and young *Paul Crum*, son of *Alan Crum* of the *American Buff Company*, who chipped in with timely hits to keep the rally alive.

John Merigold forsook his spot under a shade tree and even the women and children left their luncheon preparations to watch the dramatic finale as Larry O'Neil, Sr., stepped into the batter's box with the score

Participants in baseball game at Los Angeles Branch's annual picnic June 29: Back row, Left to Right: Fred A. Herr, METAL FINISHING (scorekeeper); Tony Grana, Southwest Plating Co.; Francis O'Dell, Surface Alloys; John Millhorn, Mefford Chemical Co.; Bob Welch; Cass Tarcysnki, Superchrome Engineering Co.; next three unidentified; Front Row: Left to Right: Larry O'Neil, Jr., in cap; Don Bedwell, Hall-Mak Co. (umpire); behind Bedwell, Gus Grigantino, Southwest Plating Co. (manager of Platers team); Larry O'Neil, Sr., L'Hommedieu Co. (manager of Suppliers team); Mel Manell, Olds Band Instrument Co.; Roy Hoyt, North American Aviation Co.; Fred Raymond, Harshaw Chemical Co. (picnic committee chairman).

22 to 21, two out and *Johnny Millhorn* and Paul Crum on third and second with the tieing and winning runs.

With his Stetson-hatted uncle, Joe Brigantino, Hollister, Calif., cattle rancher, cheering him on with lusty cowboy yells, Gus burned a shoulder-high fast ball across the plate. Larry swung his Louisville shillalah with fierce Gaelic determination and sent a line drive straight into the glove of third baseman *Bob Welch*, who held it for the game ending out.

The Platers might have won by a wider margin except for some rather unique base running in the fifth inning when two successive triples followed by two doubles failed to score a run (Honest, it happened, Abner!). The first batter in that inning tripled, and then sat down on third base for a moment to rest from his arduous labors. Much to his amazement, the subsequent batter steamed into third base a few moments later on another triple, and an embarassing situation

ensued. Third baseman *John Millhorn* of the Suppliers quickly figured out that something was wrong, and as soon as the ball had been relayed from the next township by Fred Raymond, John started tagging everybody in sight, including Umpire *Don Bedwell*. Bedwell ruled that such base-running was a blot on the mirror finish of the escutcheon of the American Electroplaters' Society and called both runners out. Two doubles followed, but no one scored when one of the runners ran back to retrieve his spectacle case and was tagged out (Lie still, Abner!).

Managers O'Neil and Brigantino advised METAL FINISHING that the game, nevertheless, should be regarded as a success because everybody had a good time, which was the primary objective, after all. A return engagement will undoubtedly be scheduled at the 1953 picnic.

The outing was attended by approximately 80 members and guests and their children. Youngest person present was *Candace Behlendorf*, 5-month-old daughter of *Walter Behlendorf*, president of the *Metal Finishing Association of Southern California*. That young lady unconcernedly nuzzled her milk bottle while Papa Walter cheered the Platers on to victory.

Basket lunches were served under the ancient oaks and maples of the park at noon. Among the numerous new faces which zoomed Los Angeles Branch membership to above the 20° mark in recent years, were a number of charter members who helped found the branch 22 years ago. It was a pleasure to see *Don Bedwell*, *Earl Coffin*, *John Merigold* and his charming wife, and *Carrol McLaren* and *Mrs. Mac*, who had motored over from Santa Ana for a day in the park with old friends.

George Hetz, Larry O'Neil and Fred Raymond supervised a series of track and field contests for the children in the afternoon and it's a question whether the kiddies or George, Fred and Larry had more fun out of it. The eyes of some of the seven and ten-year-olds bugged out bigger than the silver dollar itself when they were handed a dollar for winning a foot race.

Cincinnati Branch

The Cincinnati Branch of the American Electroplaters' Society concluded a highly successful season on June 7, 1952 with their annual Stag Picnic at Devou Country Club, Covington, Ky. Unfortunately, Greater Cincinnati was "enjoying" one of those typically humid days for which the Queen City has gained a not very enviable reputation. As a result any activity requiring physical exertion was at a minimum. A few of the hardier (but not necessarily the smartest) souls shot a minimum of nine holes of golf, and then were ready either for a shower and/or the undertaker. Of course, there was a little baseball but very little since the fortunate presence of

free beer more or less interfered with any serious playing of the national pastime.

So, card-playing, convivial conversation and a bounteous roast-beef dinner was indulged in by the majority of those present, all of whom agreed unanimously that members Ray Barry and Stewart Chipman did a thoroughly good job of planning and executing the 1952 Picnic. The only suggestion for improving future affairs was a glance at the Almanac so that we would be assured of less humidity.

CHARLES WISE
Secretary.

Melbourne Branch

A Conference sponsored by the *Melbourne Branch* of the *American Electroplaters' Society* on "*Current Alternatives to Nickel/Chromium Plating*" was held at the Hotel Federal on the 15th of May, 1952.

The present shortage of nickel, due mainly to the use of this metal in the manufacture of jet engines for aircraft, is having a serious effect on the electroplating industry, and alternative coatings that have the corrosion resistance and eye-appeal of the traditional nickel/chromium are being eargerly sought in order that plating shops may maintain production.

This conference was extremely successful, being attended by 160 platers and representatives of the motor car, aircraft and electrical industries, including 15 visitors from Sydney, Adelaide, Perth, Tasmania and New Zealand.

A series of papers dealing with alternative finishes was presented by well-known experts and the meeting was then thrown open for discussion.

The merits of the alternatives for nickel/chromium electroplate that had been suggested, were debated thoroughly, and particular interest was shown in the new alloy electroplates. Speculum (55% copper: 45% tin), bronze (90% copper: 10% tin), tin-zinc (80:20), and white brass (80% zinc 20% copper) were mentioned as some of the alloys that have been plated in Australia. This interchange of information should prove of great benefit to the Industry.

A Federal Convention of the A.E.S. to be held in Melbourne in May, 1953, was announced. *Dr. William Blum*, of U. S. A., will be present as guest speaker.

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